Marine Diesel Engine

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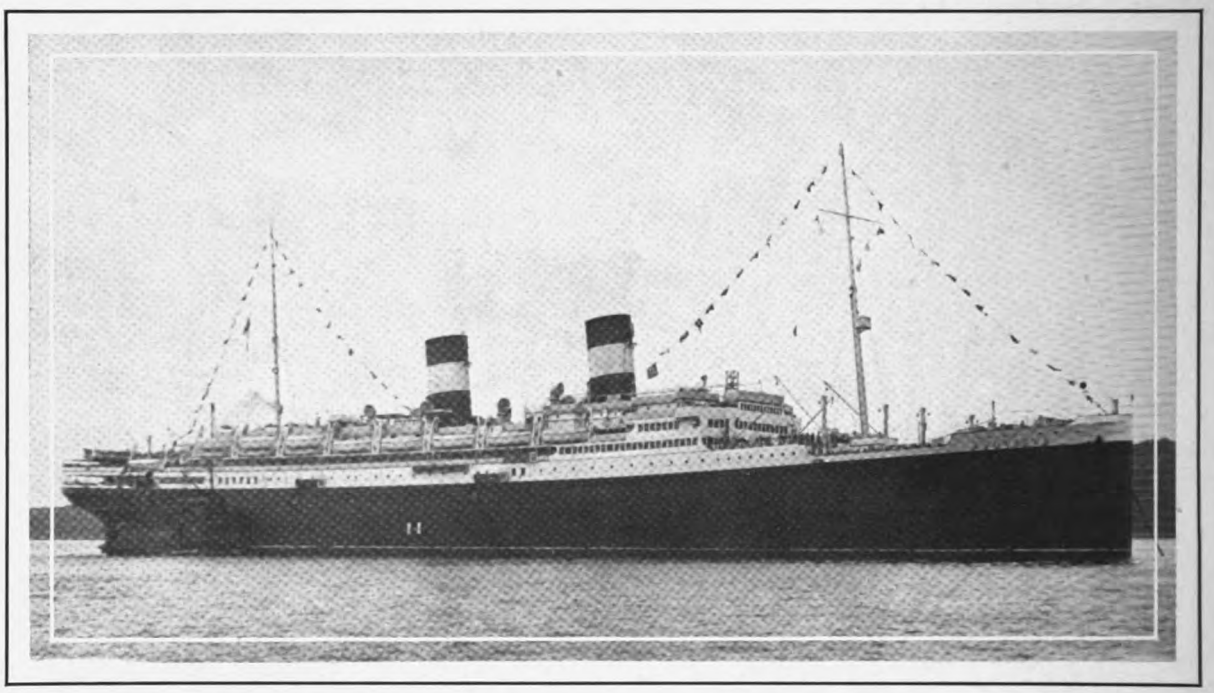

Quadruple Screw Italian Passenger Motor Liner Augustus—Length 710 feet 5 inches—Gross Tons, 32,650—Speed, 20 Knots

Over Half of World Shipbuilding is in Diesel Engined Vessels

By A. H. Jansson

IT IS now 35 years since Dr. Rudolf Diesel publically enunciated the principles of the engine that bears his name. The first public experiments were made in 1897 and a year later a small stationary engine of this type was built in the United States and installed in the Anheuser-Busch brewery in St. Louis. Though a German invention it may be noted from this brief history that the United States suffered no handicap in time as far as introduction of the engine on a practical basis is concerned.

There are two, and only two, very important reasons for the adoption of the diesel engine. First, its high thermal efficiency which is approximately twice that of the most efficient modern marine steam plant and three times that of the less efficient ordinary marine propulsive unit. Second, that it is self-contained, producing within itself the power required, eliminating standby losses and dependence on elaborate steam generating units. In spite of these extraordinary advantages the adoption of the diesel engine in larger sizes and for all types of vessels has been slow in the United States, for reasons which will be discussed later.

Some Vessels Built in 1928 Analysis—Motive Power

Type	Number	Recip.	Turbine	Diesel
Cargo	85	57	1	27
Pass. and cargo	38	9	10	19
Passenger	20	5	12	3
Tanker	45	13	....	32
Special	15	11	....	4
Total	203	95	23	85

In all the other nations of the world, however, the diesel engine has had a remarkable growth. At the shipbuilding yards of Harland & Wolff at Belfast, Ireland, for instance, no less than 250,000 tons of motor driven passenger vessels is now under construction. The latest report of Lloyd's shows that the world total of motor vessels under construction at the end of the quarter, Sept. 30, 1928 was 1,419,602 gross tons and that the total of all other types of ships combined was 1,101,740. Motorship construction in the world therefore at the present time exceeds all other types of construction by over 300,000 tons and it represents 56.3 per cent of all construction. This is an increase of nearly 5 per cent over the percentage at this time last year. More than half of Great Britain and Ireland's ship construction is in other types than motor vessels; but in the other countries almost two-thirds of the building is in motor vessels. The exact figures for Sept. 30, 1928 are: Motorship building in Britain and Ireland, 497,596, other types 592,162; or 45.7 per cent in motorships. Other countries at the same time were building 922,004 tons of motorships

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and 509,578 tons of other types; or 64.4 per cent in motorships.

There has been a very definite increase in diesel engines being built or installed in vessels according to Lloyd's. The total indicated horsepower of oil engines now in hand is 1,281,178, distributed as follows: Great Britain and Ireland, 367,490; Denmark, 171,840; Germany, 190,905; Italy, 127,550; and the United States, 33,575. On the other hand the total shaft horsepower in marine turbines at this time for the world, with the exception of Germany, is 345,500; and in steam reciprocating engines, 414,001.

This shows the preponderance of the diesel engine in world shipbuilding. And furthermore, the average size of the diesel driven ship now under construction is larger than that of the steam driven ship. The tremendous strides made by the diesel engine in world shipping are shown by comparing the diesel tonnage June 1928 and 1914. In the latter year the total world diesel tonnage was 220,000 while in 1928 there were 2933 vessels of 5,432,302 tons fitted with this type of power.

The total motor tonnage now owned in the world according to Lloyd's is 9.1 per cent of the steam tonnage. The percentage is a little below this average for Great Britain with 8.4 but much above for Denmark, Sweden and Norway with 37.9, 34.83 and 33.87 per cent respectively. Of the larger nations German is highest with 14.7 per cent, and the United States is lowest with 3.7 per cent.

That the diesel engine for marine purposes is firmly intrenched as a highly efficient and completely dependable propulsive unit may be demonstrated beyond any question by an analysis of recent ship construction the world over. For this purpose we have identified at random a group of 203 vessels of all types launched or completed in the shipyards of the world sometime during the last six months or so. An analysis by actual count for type of vessel and machinery is shown in an accompanying table. From this analysis of a large number of recent built up-to-date merchant vessels it will be noted that the diesel engine has been used in all types and strongly predominates over other kinds of machinery in some. For instance, of the 45 tankers listed, 32 are diesel driven, of the 38 pasenger and cargo vessels, 19 are fitted with diesel engines.

Current motorship building is clearly illustrated in the table, page 22, listing the launchings and trial trips of diesel vessels during the months of August and September, 1928. Many different types of vessels and a variety of nationalities as builders and owners are represented indicating the strong position held by this type of power among experienced shipping men.

In the face of this universal confidence in the commercial as well as thermal efficiency of the diesel engine for many types of vessels in many different services the American owner and operator in many instances seems reluctant to adopt this drive and particularly so in the larger sizes. A careful analysis of merchant shipbuilding in the United States for the calendar year 1927 published in the April number of MARINE REVIEW clearly shows this tendency. Of six ocean and four coastwise passenger ships that were under construction in that year none had diesel power; of nine Great Lakes freighters none had diesel drive; of five ocean going tankers, however, four were motorships. In ferries, towboats, riverboats, dredges and other special craft a fair proportion were fitted with diesel engines. The analysis shows that out of 105 steel powered craft of all types 100 feet and over in length 42.8 per cent had diesel engines as primary power, though only 25.7 per cent had direct diesel drive. Indications are that about the same proportions will hold for the year 1928.

In larger sizes suitable for 12-knot freighters of 9000 tons deadweight the diesel engine builders have been almost entirely dependent on the shipping board diesel conversion program. Twelve of this type have been completed and are in operation. Contracts for the conversion of eight additional shipping board freighters have recently been awarded. These vessels should be ready for operation early in 1929.

The marine diesel engine industry of the United States as far as merchant craft is concerned may look forward to a steadily increasing demand for the smaller size engines and for the lighter higher speed engines suitable for electric drive on account of replacements and additions to a great fleet of vessels needed in domestic trade on inland waters, rivers, bays and sounds. This fleet in the years to come is bound to grow larger and larger to care for

Twelve Diesel Ships

IN ORDER to picture concisely and clearly what is going on in the marine diesel engine industry in the United States there is presented in the following pages a series of typical recent installations. Each type of engine is illustrated and all its principal particulars are noted. This information is uniform for each engine. Practical installations have been chosen and the vessel has been illustrated and briefly described, so that the application of the engine may be clearly defined. In other words we present not merely a number of different makes of diesel engines but actually a variety of motor vessels for the merchant service.

Diesel Ships--Where to Find Them

Freighters

Name and Service	Page
City of Elwood, Ocean	30
Douglas Alexander	27
Liberty, Lakes	34
Louis Geraci, Ocean	32
New Orleans, Ocean	38
Oldham, Ocean	26

Tanker

Sun, Ocean	25

Ferries

Name and Service	Page
Bainbridge	40
Golden Poppy	28

Tug

Gerald H. Fagan	42

Other Types

El Dorado, Fishing	44
Orient, Fishing	36

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the ever expanding trade as population and wealth increase. And in this field there is a very evident growing acceptance and popularity for the diesel engine.

As regards the larger sizes, the owner and operator must be made to feel certain of its commercial superiority over other types of drive. To do this it is necessary that the engine builder should fully understand the peculiar conditions of service of any prospective customer. He should in fact have the outlook of the experienced naval architect before he attempts to sell the operator an engine, just to sell the engine, regardless of its suitability for the particular trade in mind. Needless to say no engine should be offered which is in any sense in the experimental stage. The engine ought to be thoroughly proved in reliability. Material, design and workmanship should be of the highest order so that its life should be at least equal to that of any other type of machinery. It will also be necessary for the engine builder to maintain the closest contact with the operator long after the engine is sold and is in practical everyday operation. Insofar as practicable, and he ought to make it practicable pretty far, the engine builder should be very much concerned with the quality of operating personnel chosen for the ship in which his engine is installed and he might well continue to maintain one of his own thoroughly experienced operating engineers on the ship for a much longer period than is now customary.

The experienced shipping world believes in the efficiency of the internal combustion engine and good evidence has been presented in this article to prove that this is so. Any operator, however, will try to determine his overall returns. Into such calculations will enter many things besides the admittedly remarkable thermal efficiency of the diesel engine. He will look into the first cost; he will want assurance of complete dependability; he will want some guarantee of reasonable upkeep and repair costs; if his particular service includes ports of low boiler fuel that will be considered. If he is considering a passenger ship the question of vibration is of great importance. He moves slowly and cautiously and he must be told the truth. On this basis and this basis alone, winning by sheer competitive merit, will the American diesel engine builder create a substantial dependable marine business.

Ask Bids for Liner

The Canadian Pacific Steamship Co. has called for tenders for the construction of a large vessel to be placed on the St. Lawrence route. The principal dimensions of the new vessel will be as follows: Length, 640 feet; breadth, 85 feet; maximum draft, 30 feet; gross tonnage, 26,000. The new vessel is to be fitted with machinery of the latest design and will have a service speed of 21 knots.

Launchings and Trial Trips of Foreign Diesel Ships During Two Months

The Following Diesel Vessels Were Launched During This Period

NAME	Nationality Builder — Owner	Type	Number of Propellers	Dimensions L′ x B′ x D′	Tonnage	Speed Knots	Make of Engine	Date Year 1928
Calgarolite	British — Canadian	Tanker	Two	542x70½x38¾	16,000 d.w.	12	Krupp	Sept. 14
California Standard	German — American	Tanker	Two	.....	15,000 d.w.	11½	Krupp	Aug. 25
Caroni River	British — British	Cargo	Two	460x59x33¾	11,000 d.w.	..	B.&W.-H.&W.	Sept. 3
Clan Macdougall	British — British	Cargo	One	450x62x39½	10,000 d.w.	14	H.&W.-B.&W.	Sept. 28
Dagrun	Swedish — Norwegian	Cargo	One	380x53¾x36	8,200 d.w.	..	Kockum-M.A.N.	Aug. 12
Dalfonn	Swedish — Norwegian	Tanker	Two	474x64x37	.....	..	Eriksberg's	Sept. 20
Havel	German — German	P. & C.	Two	498x61x27	11,000 d.w.	13	Schichau-Sulzer	Aug. 9
Kulmerland	German — German	P. & C.	....	.....	10,000 tons	13	A.E.G. Diesel	Aug. 29
Magdalena	German — German	P. & C.	Two	.....	9,600 tons gross	15	Sulzer Bros.	Aug. 23
Majang	Dutch — Dutch	Cargo	One	165x28⅔x10	400 tons	8¼	Sulzer Bros.	Sept. 1
Makasser	Dutch — Dutch	Cargo	One	165x28⅔x10	400 tons d.w.	8¼	Sulzer Bros.	Sept. 22
M. O. P. 216C	Dutch — Argentine	Dredge	..	290x59x19½	1500 cu. m.	9	Smit M. A. N.	Sept. 27
Oilpioneer	British — British	Tanker	Two	424x53½x—	8,500 ts. d.w.	..	Neptune Polar	Sept. 3
Ophir	Dutch — Dutch	Passenger	Two	386½x51½x23	7,200 Displ.	15¼	Sulzer Bros.	Sept. 1
Paganini	Italian — Italian	P. & C.	One	279½x52½x..	2,300 tons gr.	12	B. & W.	.....
Poelen Laut	Dutch — Dutch	C. & P.	Two	515¾x61x36¾	17,730 Displ.	15	Sulzer Bros.	July 29
Poelau Roebiah	Dutch — Dutch	Cargo	One	490x61x36¾	17,500 Displ.	..	Sulzer Bros.	Aug. 12
Pollux	Swedish — Swedish	Cargo	One	466x61⅝x36¼	12,300 tons d.w.	10½	Kockum-M.A.N.	Aug. 4
Port Alma	British — British	P. & C.	Two	500x63x....	11,350 t. d.w.	15	Doxford	Sept. 17
Rangitiki	British — British	P. & C.	..	530x70x....	17,500 gr.	....	Brown-Sulzer	Aug. 29
St. Louis	German — German	Pass.	Two	.....	16,000 gr. tons	16	D.A. M.A.N.	Aug. 2
Unknown	British — British	Tanker	Two	205x36½x15	1,200 t. gr.	..	Werkspoor	Sept. 20
West Lynn	British — British	Cargo	One	400x54x37	8,500 tons d.w.	10½	B.&W.-H.&W.	Aug. 14
Winton	British — British	Cargo	One	375x....x....	4,000 gr. tons	....	B.&W.-H.&W.	Aug. 8

The Following Diesel Vessels Completed Trials During This Period

NAME	Nationality Builder — Owner	Type	Number of Propellers	Dimensions L′ x B′ x D′	Tonnage	Speed Knots	Make of Engine	Date Year 1928
Benedick	British — British	Tanker	Two	440x58x32¾	10,300 d.w.	11¾	Kincaid & Co.	Aug. 15
British Honour	British — British	Tanker	One	.....	10,000 d.w.	....	Sulzer Bros.	July 30
British Justice	British — British	Tanker	Two	.....	10,000 d.w.	....	Doxford	Aug. 10
British Pluck	British — British	Tanker	Two	240x32½x....	1,000 d.w.	10¾	Neptune Polar	Aug. 14
British Thrift	British — British	Tanker	One	195x39½x....	620 tons d.w.	9¼	Nep. Polar	Sept. 4
Burgenland	German — German	Cargo	....	.....	10,000 tons	....	.....	Aug. 17
Ciudad del Salto	British — Argentine	P. & C.	Two	250x42x11½	1,952 gr. tons	12	B.&W.-H.&W.	Sept. 21
Der Markgraf	German — German	P.&C.	One	108x17½x....	.....	9	3 cyl.,150 hp.	August
Duisburg	German — German	P.&C.	One	460x60¾x....	10,000 tons d.w.	13	A.E.G. D.A.	Sept. 15
East Lynn	British — British	Cargo	One	400x54½x28	8,500 tons d.w.	13¼	Doxford	Aug. 23
Ernst Moritz Arndt	German — German	.....	One	138x20½x....	.....	....	Deutz	July
Finnanger	Dutch — Norwegian	Tanker	Two	493½x64¼x36½	13,600 tons d.w.	11	Werkspoor	Sept. 19
Freshmoor	British — British	Tanker	One	210x34¼x17¾	1,400 tons d.w.	10½	Doxford	Sept. 27
General van Geen	Dutch — Dutch	P.&C.	One	230x38½x17	.....	....	Nep. Vickers	Aug. 3
Gustaf E. Reuter	Swedish — Swedish	Tanker	Two	407x55x32	9,000 tons d.w.	....	B.&W.	July 28
Highland Monarch	British — British	P.&C.	Two	520x69x35¾	14,450 tons gr.	....	D.A.H.&W.-B.&W.	Oct. 2
Hilda Knudsen	Danish—Norwegian	Tanker	Two	470x64½x35½	13,200 tons d.w.	....	B.&W.	July 11
Kota Gedf	Dutch — Dutch	Cargo	One	448⅓x60½x33½	9,500 tons	14	Fijenoord M.A.N.	Sept. 19
Kwaibo	British — British	P.&C.	Two	157x26x10	.....	....	Bolinders	Sept. 5
Palmares	German — Brazilian	P.&C.	....	.....	.....	....	.....	Sept. 19
Phonicia	German — German	Cargo	One	375x53½x...	6,100 tons d.w.	14½	Sulzer Bros.	Aug. 29
Robert Muller II	German — German	.....	Two	220x27x10	.....	....	Sulzer Bros.	....
Saale	German — German	Cargo	Two	497x61x39½	16,700 Displ.	15.5	Schichau-Sulz.	July 25
Santa Barbara	British — American	P.&C.	Two	486x64x45	7,000 tons d.w.	16½	Sulzer Bros.	Aug. 20

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Diesel Electric Drive Savings

Study Vessel and Conditions of Service—Determine Overall Economics—On This Basis Finds Wide Field of Application

By Frank V. Smith

IN ANALYZING the type of propelling machinery best suited for a specific type of ship from the standpoint of minimum power cost, the principal factors consist of the capital charges based on the original price of the equipment, fuel costs and labor. The type of machinery selected for a given vessel may also affect its earning capacity. Items included in this field of investigation consist of the space requirements of the machinery which, in turn, limits the bulk freight carrying capacity; the weight of the machinery which limits the tonnage capacity, and the type and quantity of fuel used which, in its turn, affects both the bulk and weight cargo carrying capacity and also radius of effective operation. Other variable factors enter the picture, such as length of voyage, extent of service and type of cargo and availability and price differential of the various kinds of fuel.

When the many different types of ships engaging in inland waterway and deep sea traffic are considered, with the many different external conditions existing, the problem of correctly evaluating the various economic differences is one of great complexity.

To all intents and purposes there is no clear outline of embarkation from one economic sphere of application to another, using ship type as a basis, and it is doubtful if generalized statements will ever prove to be fruitful sources of correct information. In writing about the amazing progress of diesel electric drive, therefore there is no attempt to use diesel electric drive as a magic wand, or cure-all, for all of the economic ills from which the merchant marine suffers.

The past year has seen a great extension of the power limits of diesel electric drive and also its extension to many new types of ships. In each specific case the decisions have been based on a vigorous investigation and analysis. Probably one of the most controversial fields which the diesel electric drive has entered is that of the cargo vessel engaged in overseas traffic. Three such vessels are soon to be placed in service, the rating of their main propelling machinery being 4000 shaft horsepower at 60 revolutions per minute propeller speed.

The question that the man on the street is likely to ask is: "Why interpose electric machinery between the prime mover and the propeller on a cargo vessel in which special maneuvering qualities are not a primary asset?"

But let us suppose a start is made by being perfectly unbiased with a willingness to perform all the necessary calculations to get a clear picture of the entire situation. First, it is known that, with any direct form of piston drive engine, the physical dimensions and the weight of the prime mover are going to be a function of the power and speed of the engine.

If a direct drive engine of the diesel type designed for 4000 shaft horsepower (or any constant horsepower) is considered, a curve of unit weight and unit dimension may easily be drawn up using a variable designed revolutions per minute as the base. An example might be an engine capable of developing 4000 shaft horsepower at 120 revolutions per minute. If the mean effective pressure is kept constant its power is reduced to 2000 shaft horsepower at 60 revolutions per minute. In order to increase the power at 60 revolutions per minute to 4000 shaft horsepower it will be necessary to double the torque. If this is accomplished without a change in the mean effective pressure then the area of the cylinders or the number of engines must be doubled or some compromise must be struck between piston area and length of stroke which will have the effect of doubling the torque.

With the diesel electric drive a weight and space factor must also be plotted against designed propeller revolutions per minute as a base. Now one of the peculiarities of diesel electric drive is that the prime mover revolutions per minute is not a function of propeller revolutions per minute. One may start out with a small, compact, powerful, semi-high-speed diesel engine to drive a generator and its weight will be the same whether the propeller turns at 60, 90 or 120 revolutions per minute.

This paper has been especially prepared for MARINE REVIEW by Frank V. Smith, engineer, Federal and Marine department, General Electric Co.

Diesel Electric Tug Chagres—Built by the Mechanical Division, Panama Canal

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The weight of the motor which is directly connected to the propeller shaft, however, is affected by the revolutions per minute and must be built for the torque value corresponding to the propeller revolutions per minute. A summation of the variable motor weight and constant diesel engine drive generator weight gives a total weight with which to compare the diesel direct drive.

One gain to be realized through a reduction in the propeller revolutions per minute is that of increased propeller efficiency. If the two forms of drive are compared, and on a different designed propeller revolutions per minute basis, assuming a higher speed for the direct form of drive, then enough power has to be added to the direct drive to enable it to maintain the same ship speed.

In addition to the plotting of unit curves of space and weight of machinery plotted against designed propeller revolutions per minute, a similar curve must also be drawn up for first cost of the machinery. The evaluation of these curves then gives some minimum point, the value which it is desired to ascertain. Each system may carry with it, because of its inherent design characteristics, valuable factors difficult of a pure monetary evaluation.

In a comparison of the two types of drive the diesel electric system seems to have the best of the argument. Bridge control is always a desirable feature even if not an absolutely necessary adjunct. Another feature is the ability to operate the ship with part of the main plant only in operation. The COURAGEOUS, one of the new vessels, has four main diesel engine driven generators. With three engines in operation the vessel can maintain 90 per cent maximum speed and, with two, 79 per cent speed. The motor which drives the propeller shaft is of the double type; that is, two motors are mounted on the same shaft. The reliability of the equipment is therefore greatly enhanced.

Diesel Electric in Cargo Ship

These new vessels are no doubt going to be discussed pro and con for some time to come, because in a way they are so revolutionary. Their actual performance record is bound to prove of great interest and will either prove or disprove the correctness of a very carefully worked out analysis prior to their building.

In the field of new application diesel electric drive is being applied to lightships, tunnel stern types of river towboats and packet boats. Probably the most interesting of these is the lightship, a type of ship that serves as a beacon light and rides at anchor the greater part of the time. In this case weight and space of machinery seem of little importance. Heretofore ships of this type have been furnished with steam propelling equipment to enable them to go to and from their station, and for driving ahead in the face of a storm in order not to drag their anchor. While at anchor under normal weather conditions a small amount of power only is required for auxiliary purposes.

The diesel electric form of propulsion allows a much longer stay at the station because of the very low fuel consumption, and also gives an immediate source of maximum power for emergency use. With steam drive the standby losses were quite high as the fires under the boilers had to be kept burning at all times in order that steam might be raised without undue delay. The anchors on these lightships are extremely heavy, being of similar size to those carried on vessels of ten times the tonnage. The diesel electric form of drive permitted the installing of a large electric-driven anchor windlass.

In viewing the present accomplishments of diesel electric drive, there is no reason to believe that it has yet reached its zenith. There are a number of fields of application yet untouched which, on complete economic analysis, may prove to be productive of a much more rapid growth than in the past.

The department of commerce has published a report from Julian C. Dorr, consul at Genoa stating that the largest drydock in the Mediterranean sea started at Genoa in May 1925 has been completed and is now in use.

Large Diesel Yacht Launched at Bath Yard

THE reopening of the Bath Iron Works as a first class shipyard was celebrated in the traditional manner when practically the entire population of Bath, Me., turned out to witness the launching on Oct. 3 of the large and magnificent twin screw, diesel yacht, VANDA, *the first launching to take place from the plant of the Bath Iron Works since it was reopened, Dec. 5, 1927. This beautiful yacht designed by the New York naval architects, Henry J. Gielow Inc. for E. B. Dane, is built of steel to the highest class at Lloyds. Her length over all is 243 feet 3 inches; on waterline, 219 feet 9 inches; beam, 36 feet; depth at lowest point to main deck, 22 feet; and loaded draft, 15 feet. The main drive consists of two Bessemer four cycle, solid injection diesel engines each having eight cylinders, 18 inches in diameter and 22-inch stroke, developing 1500 shaft horsepower. This is sufficient power to give the yacht a speed of about eighteen miles per hour with the propellers turning at 300 revolutions per minute.*

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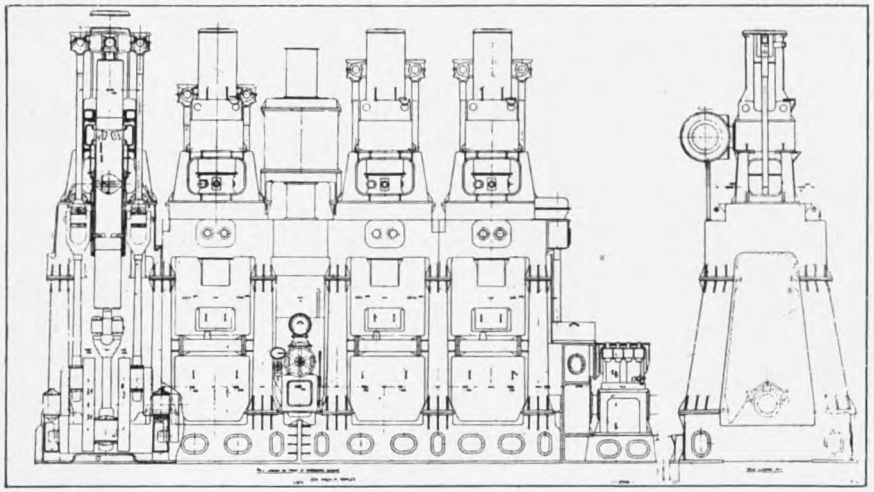
Single Diesel Direct Drive in Tanker Sun

One Engine—2800 B. H. P.



DESCRIPTION

This engine, of opposed piston type, is connected to a single screw in the 13,486 deadweight ton tanker SUN. The engine is of 4-cylinder, 2-cycle, solid injection Sun-Doxford type with the scavenging pump attached to the main crankshaft between No. 2 and No. 3 cylinders. There is one working stroke per revolution with a mechanical efficiency of 87 per cent.

Engine

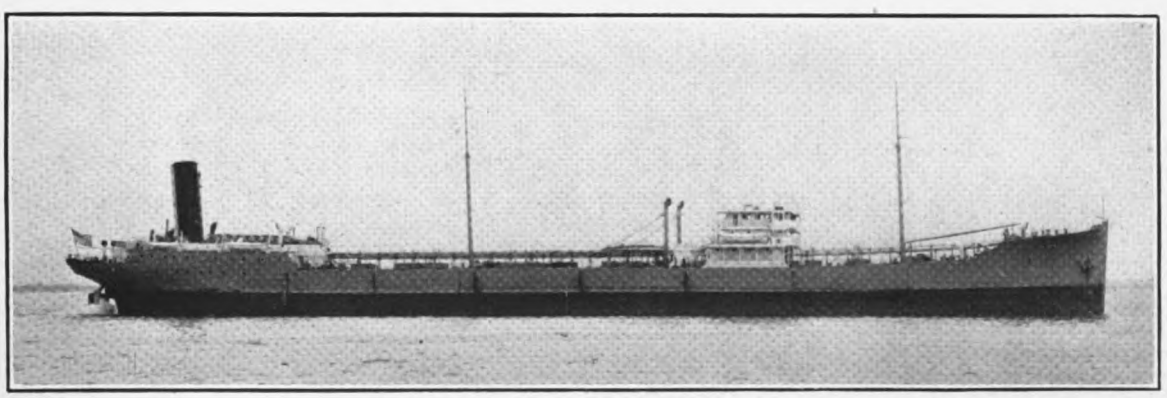
Name of Engine—Sun-Doxford; **Year**—1928
Builder—Sun Shipbuilding & Dry Dock Co.
Cycle—2; **No. of Cylinders**—4; **I. H. P.**—3220
B. H. P.—2800; **Action**—Single; **Injection**—Solid
Scavenging—Attach; **Piston Coolg.**—Fresh Water
Bore—32.62 in.; **Stroke**—91 in.; **R. P. M.**—80
Piston Speed—606 ft. p. m.; **B. H. P. per Cyl.**—700
I. H. P. per Cylinder—804; **Mechanical Eff.**—87%
Stroke to Bore—3.85; **Wkg. Strokes per Rev.**—1
Length O. A.—49 ft. 4 in.; **Height O. A.**—32 ft.
Width Overall—13 ft. 5 in.; **Reversing**—Yes.
Air Compressors—Two, one electric motor-driven 100 c. f. m. and one, steam-driven 150 c. f. m.

Vessel

Name—M. S. Sun; **Builder**—Sun S. B. & D. D. Co.
Type—Single screw ocean going oil tanker
Main Drive—One diesel engine direct connected
Length B. P.—480 ft.; **Beam**—65 ft. 9 in.
Depth—39 ft.; **Draft**—27 ft. 2 in.
Displ.—19,000 tons; **Deadweight**—13,486 tons
Speed in Knots—11; **No. of Propellers**—1
Fuel Capacity—4030 bbls.., 570 tons
Fuel Consumption—Lb. per b. h. p. per hr.—0.41 Lb. per i. h. p. per hr.—0.357; tons per day—12.3; **Radius Without Refueling**—10,000 knots
Generators—Two of 75 k. w. each at 375 r p. m. General Electric direct driven by oil engine manufactured by the Bessemer Gas Engine Co.

Remarks

This large single screw diesel oil tanker is used in ocean service and is a sister ship of the diesel tanker SUN OIL. The SUN is constructed on the Isherwood system. The vessel was launched July 14 and successfully completed her sea trials July 25, when she was turned over to her owner. Capacity of the vessel in gallons is 5,175,000. Engine room auxiliaries are completely electrified and include certain cargo pumps and other auxiliaries.



Single screw ocean going oil tanker Sun—Main drive 2800 B. H. P. Sun-Doxford engine

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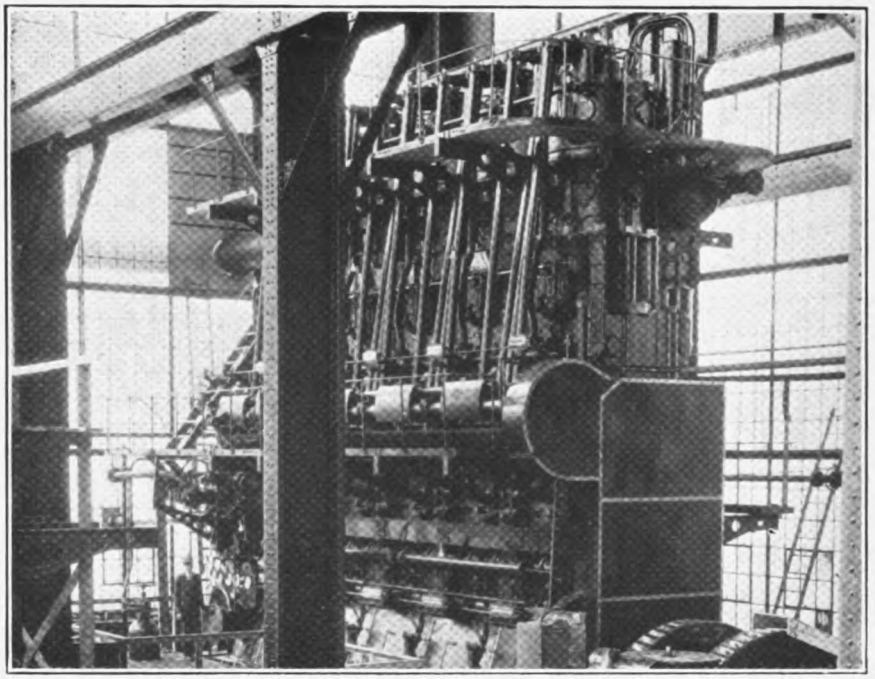
Diesel Direct Drive in Freighter, Oldham

One Double Acting Engine—4290 B. H. P.



Engine

Name of Engine—McIntosh & Seymour; 1928
Builder—McIntosh & Seymour Corp.
Cycle—Four; **No. of Cyls.**—5; **B. H. P.**—4290
Action—Double; **Injection**—Air; **Scavenging**—
Piston Cooling—Oil cooling; **Bore**—32 inches
Stroke—52 inches; **R. P. M.**—115.5
Pist. Spd.—996.6 f. p. m.; **B. H. P. per Cyl.**—858
Stroke to Bore—1.875; **Wkg. Strokes per Rev.**
Weight—925,000 lb.; **Per B. H. P.**—215.6 lb.

Vessel

Name—Oldham; **Owner**—U. S. Shipping Board
Converted to Diesel—At Maryland D. D. Co.
Type—Single screw steel, ocean cargo vessel
Main Drive—One direct connected diesel engine
Length B. H. P.—395 ft. 6 in.; **Beam**—55 ft.
Depth—34 ft. 11 in.; **Draft**—27 ft. (summer)
Deadweight—9300 tons; **Regular Crew**—36
Speed—12½ knots; **No. of Propellers**—One
Fuel Consumption—Pounds per b. h. p. hr—0.42

DESCRIPTION

One engine of this size and type direct connected to the propeller is being installed in each of two shipping board vessels. It is a double acting, direct reversible, vertical, five cylinder, four stroke cycle, crosshead type of engine developing a maximum of 4290 brake horsepower. With this power a speed of 12½ knots is anticipated. These freighters when converted will be economical and modern in every respect. Complete conversion is expected early next year.

Remarks

In addition to the OLDHAM her sister vessel, the GALVESTON, is also being converted from steam to diesel drive by the installation of the type of double acting engine illustrated and described on this page. Both of these shipping board freighters are now undergoing conversion at the yard of the Maryland Dry Dock Co., Baltimore. Six other vessels on which bids have been taken are also to be converted to diesel drive with three other makes of engines in the present diesel conversion program of the shipping board.

In the first program which was completed early this year, 12 vessels were converted to diesel drive using five makes of engines each of less power than in the present program.

This shows the S. S. Potter, sister vessel of the Oldham & Galveston, now being dieselized

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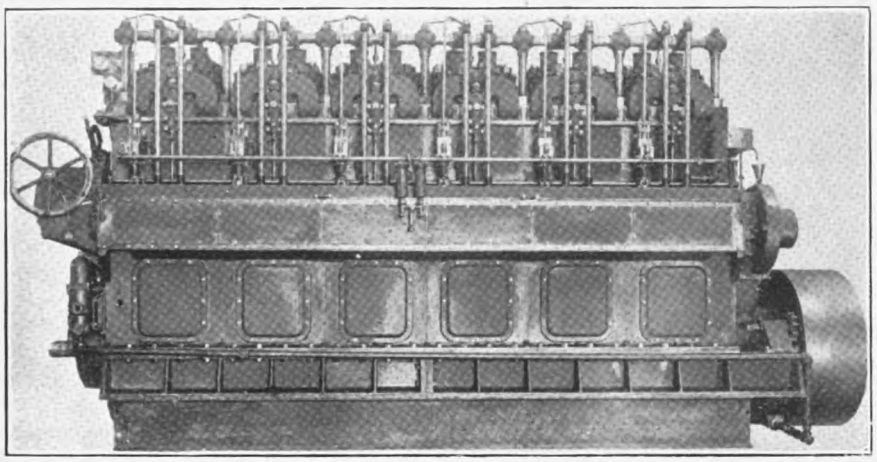
Diesel Direct Drive in Lighter Douglas Alexander

One Engine—500 B. H. P.



DESCRIPTION

The engine is of the 6-cylinder, 4-cycle vertical, single acting, direct reversible type and utilizes mechanical injection of fuel. This system comprises individual fuel pumps for each cylinder and pressure injection without the aid of mechanically operated spray valves. A feature of the engine is the use of a rectangular cylinder block.

Engine

Name of Engine—Nelseco 6-MI-22; **Year**—1928
Builder—New London Ship & Engine Co.
Cycle—4; **No. of Cylinders**—6; **I. H. P.**—625
B. H. P.—500; **Action**—Single; **Injection**—Solid
Piston Cooling—No; **Bore**—15 in.; **Stroke**—22 in.
R. P. M.—230; **Piston Speed**—842 feet per minute
Pressure Indicated—92.5; **Pressure Brake**—74
B. H. P. per Cyl.—83.5; **I. H. P. per Cyl.**—104
Mechanical Efficiency—80%; **Stroke to Bore**—1.47
Wkg. Strokes per Rev.—1 stroke per 2 revolutions
Lgth. O. A.—18 ft. 2 in.; **Width O. A.**—4 ft. 8 in.
Height Overall—8 ft. 4½ in. above shaft
Weight—One engine, 75,800 lbs. incl. flywheel
Reversing—Direct reversible; **Air Comp.**—None

Vessel

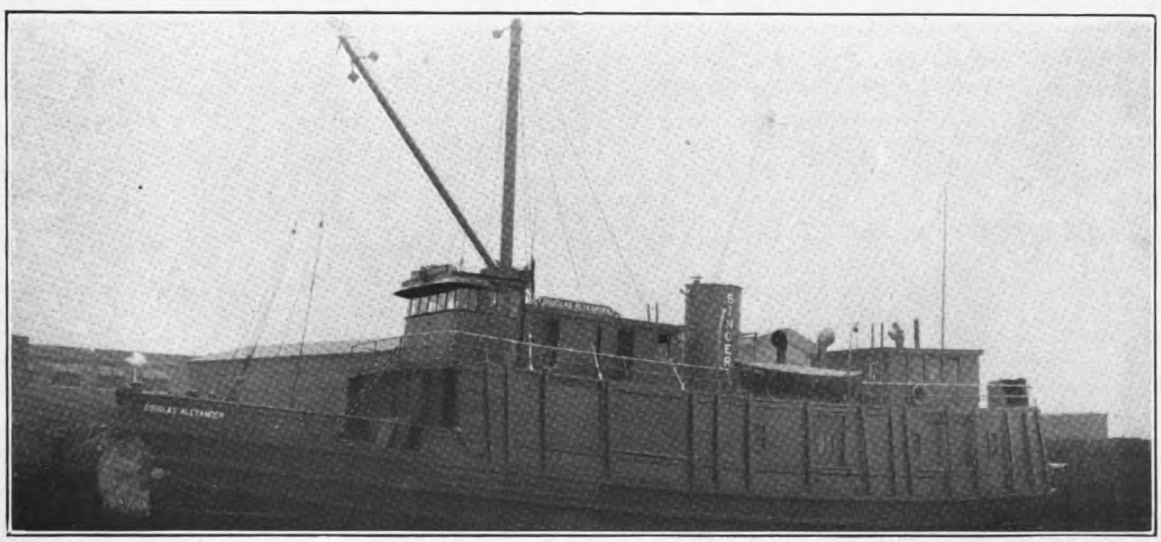
Name—Douglas Alexander; **Type**—Cargo lighter
Main Drive—Diesel direct; **Lgth. B. P.**—100 ft.
Beam—30 ft. 7 in.; **Depth**—10 ft. 4 in.
Number of Propellers—One; **Speed**—10 knots
Fuel Consumption—Lbs. per b. h. p. per hour—0.40
Radius Without Refueling—20 days

Remarks

The Douglas Alexander is owned by the Singer Manufacturing Co. of Elizabethport, N. J., and is used in transporting sewing machines for export from New York harbor.

Some of the Standard Sizes of Engines Built

B. H. P.	R. P. M.	Cycle	No. Cyls.	L. O. A feet	L. O. A inches	Height feet	Height inches	Width feet	Width inches	Weight
300-370	220-250	4	4	14	4	11	2¼	4	8	55,025
375-460	220-250	4	5	16	7	11	2¼	4	8	64,000
450-550	220-250	4	6	19	0	11	2¼	4	8	73,600
600-735	220-250	4	8	23	8	11	2¼	5	9	92,800
500-600	220-250	4	3	13	1¼	11	10½	5	9	90,200
650-800	250-300	4	4	15	11½	11	10½	5	9	112,900



Diesel direct cargo lighter Douglas Alexander—Single acting, mechanical injection—One engine of 500 B.H.P.

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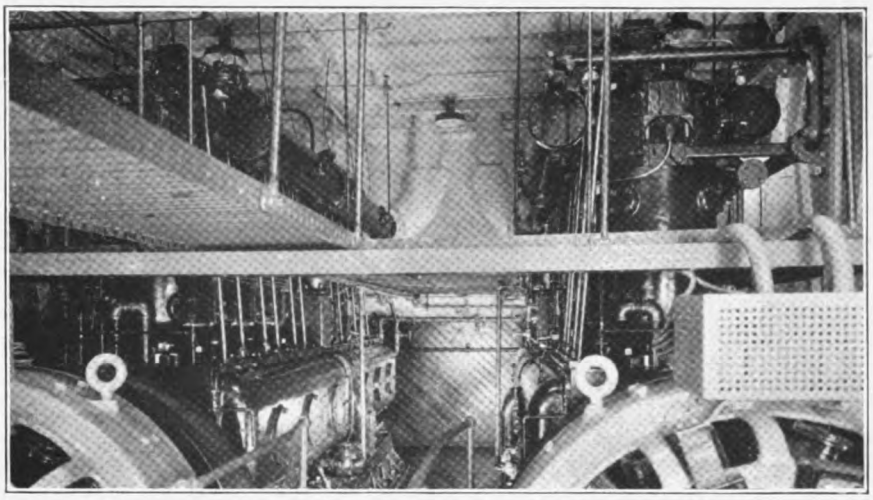
Diesel Electric Drive in Ferry Golden Poppy

Three Engines—Each 400 B. H. P.



Engine

Name of Engine—Ingersoll-Rand; **Year**—1927
Builder—Ingersoll-Rand Co.; **Type**—PR
Cycle—4.; **No. of Cylinders**—6; **B. H. P.**—400
Action—Single acting; **Injection**—Solid direct
Piston Coolg.—No; **Bore**—14 in.; **Stroke**—19 in.
R. M. P.—265; **Piston Speed**—840 feet per min.
B. H. P.—per Cyl.—66 2/3; **Stroke to Bore**—1.35
Working Strokes per Revolution—Three
Weight—One engine, 65,000 lbs.; 162 lbs. per h. p.
Reversing—Engine non-reversing; electric drive
Air Compressors—For starting; auxiliaries only

Vessel

Name—Golden Poppy; diesel electric drive
Type—Diesel electric double ended ferry
Main Drive—Diesel electric (motor driven Prop.)
Length O. A.—240 feet; **Draft**—11 feet 6 inches
Beam Molded—44 feet; **Over Guards**—60 feet
Speed—13 knots; **No. of Propellers**—two
Generators—Three main and three auxiliary built by Westinghouse. The main generators are of 270 kilowatts at 265 r. p. m. The auxiliary units are of 40 kilowatts at the same revolutions per minute. Main generators are each direct-connected to one 400-horsepower diesel engine described here.

There is one 950 shaft horsepower electric propulsion motor at each end of ferry.

DESCRIPTION

The power plant of this ferryboat is of the single acting, solid injection 4-cycle type built by the Ingersoll-Rand Co. Trunk pistons are employed as the compression units in this non-reversible marine oil engine. Ignition is induced by the heat produced by compression only, no external heating elements being required. No air compressors are required except for starting.

Remarks

The GOLDEN POPPY is one of four sister ferries and is owned by the Golden Gate Ferry Co. operating between San Francisco harbor and Berkeley, Calif. These vessels were built to give proper transportation facilities to the residents of Berkeley and adjoining districts.

The GOLDEN POPPY was built by the General Engineering Co. of Alemeda, Calif., as were the other three sister vessels. The ferry will carry 350 passengers and 85 automobiles and has a gross tonnage of 780. These boats are operated throughout the entire year, each one maintaining a 24-hour service one third of the time and a 14-hour service the balance of the time.

If one of the boats is taken out of service for any reason, both air receivers are charged to 300 pounds pressure, thereby providing the compression necessary for starting. Engine room auxiliaries are convenient and flexible in operation.

Diesel electric passenger and automobile ferry GOLDEN POPPY—Three diesel generating sets—Two propulsion motors each 950 S.H.P.

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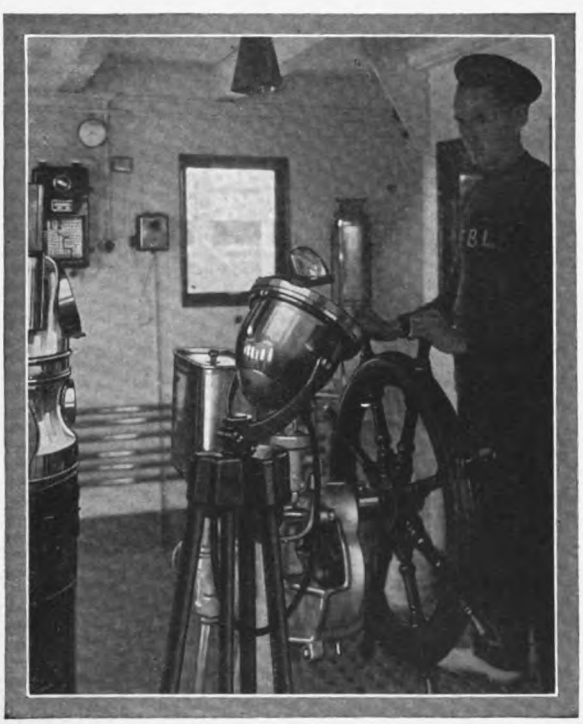
The Ship's Continuous Guide Is Its Compass

THERE is no substitute for the compass, it is in constant use while the vessel is under way. Other navigational equipment provides means for confirming the vessel's position from time to time, but **the compass is the foundation of all navigational work.** Because of its importance there can be no compromise — it must be the best. That is why 112 of the World's Merchant Fleets and the leading Navies of the World use Sperry Gyro-Compasses.

The directive force, or power to seek and hold the meridian, of the Sperry Gyro-Compass is 150 times that of the magnetic compass. This great directive power is obtained from natural laws which give TRUE NORTH indications. The danger of error by having to use mathematical formulas to convert compass readings to "TRUE" is thus avoided. The Sperry Gyro-Compass also operates indicating compasses, called "Repeaters," for steering, taking bearings, aiding in obtaining accurate radio bearings, recording the vessel's course and even steering the ship.

The navigational equipment of a ship is not complete without the Sperry Gyro-Compass.



The Sperry Gyro-Compass

1. Develops 150 times the directive force of the standard 7½" card, magnetic compass.
2. Gives TRUE NORTH readings directly. There is, therefore, no need of employing mathematical formulas to convert its reading to TRUE.
3. Provides better steering because of its instantaneous indications of any movement of the ship's head from the course.
4. Provides means for taking accurate bearings, both direct and by radio, quickly and without calculation.
5. Records the vessel's course.
6. And even steers the ship through the aid of the Gyro-Pilot.

Steering the S.S. Fort Victoria. Here, as on ships of 111 other fleets, the Sperry Gyro-Compass serves in the important capacity of guiding the ship on her course as recorded on the Course Recorder in the left background.

THE SPERRY GYROSCOPE COMPANY

BROOKLYN
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NEW YORK
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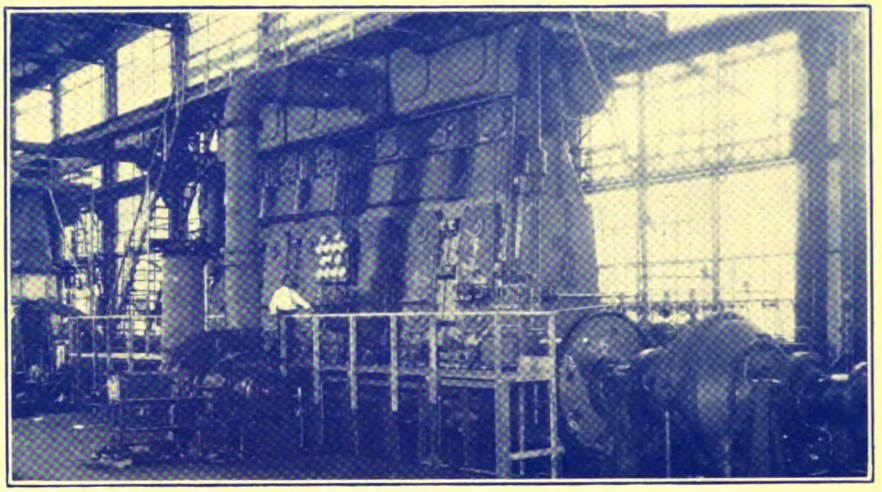
Diesel Direct Drive in Freighter City of Elwood

One Engine—4000 B. H. P.



DESCRIPTION

This engine is of the heavy duty, single acting, two-cycle, six-cylinder, crosshead type. It is of the same general design as the European Sulzer Bros. type marine diesel engines of which there are said to be over 1,500,000 horsepower either in service or building. One engine of this type is now being installed in one of the shipping board vessels CITY OF ELWOOD.

Engine

Name of Engine—Busch-Sulzer; **Year**—1928
Builder—Busch Sulzer Bros. Diesel Engine Co.
Cycle—2; **No. of Cylinders**—6; **B. H. P.**—4000
Action—Single; **Injection**—Air; **Scaveng.**—Port, double, with motor-driven turbo-blower
Piston Coolg.—Water; **Bore**—30in.; **Stroke**—52 in.
R. P. M.—104; **Piston Speed**—901.3 ft. per minute
Pressure Brake—69.0; **B. H. P. per Cyl.**—667
Wkg. Strokes per Rev.—6; **L. O. A.**—42 ft. 3¾ in.
Height Above Centerline of Shaft—25 ft 3½ in.
Width O. A.—12 ft. 6 in.; **Stroke to Bore**—1.733
Weight—810,000 lbs.; **Per B. H. P.**—202.5
Reversing—Direct 3-stage, integral with engine

Vessel

Name—City of Elwood; and Ward
Type—Freighter; **Owner**—U. S. Shipping Board
Main Drive—Direct diesel; **L. B. P.**—395½ ft.
Beam—55 feet; **Depth**—34 ft. 11 inches
Draft—27 feet ½ inch; **Speed**—App. 12.5 knots
Daily Fuel Consumption before Conversion—35 tons
Fuel Consumption after Conversion—Est.—17 tons
Fuel Capacity—1528 tons; **Dead Weight Tonnage**—9700 (Before Conversion)
Gross Tonnage—6171; **Net Tonnage**—3797 (Before Conversion)
Normal Steaming Radius—11,250 knots; (Before Conversion) **Year**—1921
Number of Propellers—One

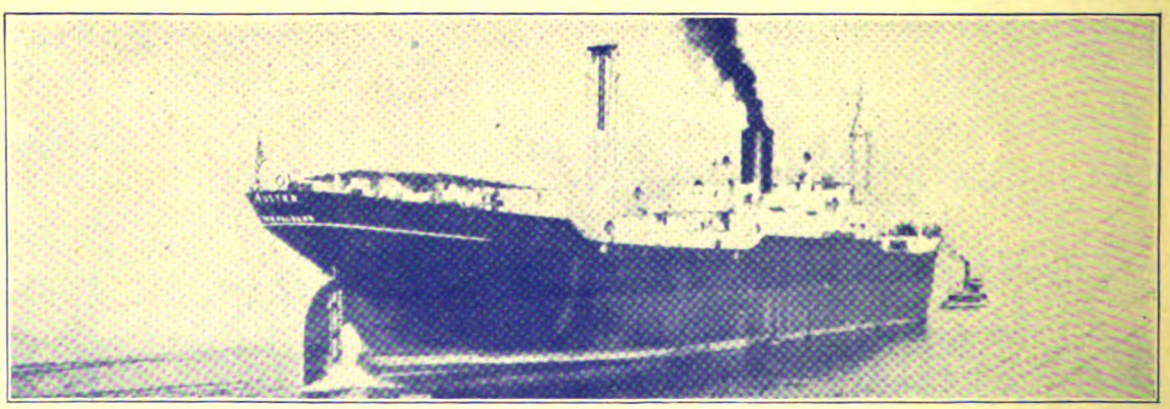
Remarks

The CITY OF ELWOOD and the WARD are single screw ocean cargo vessels of the war program and completed early in 1921 by Doullut & Williams Shipbuilding Co. Conversion to diesel drive is now under way. With diesel propulsion the vessels will operate more economically and with increased speed. The conversion should be completed early next year.

The present machinery and boilers are being removed and the main diesel engines and auxiliaries will be installed.

When completed, the vessels will have a deadweight capacity of about 9300 tons.

Engines available in sizes up to 7000 s. h. p.



This shows the S. S. Potter, sister vessel of the City of Elwood and Ward now being dieselized

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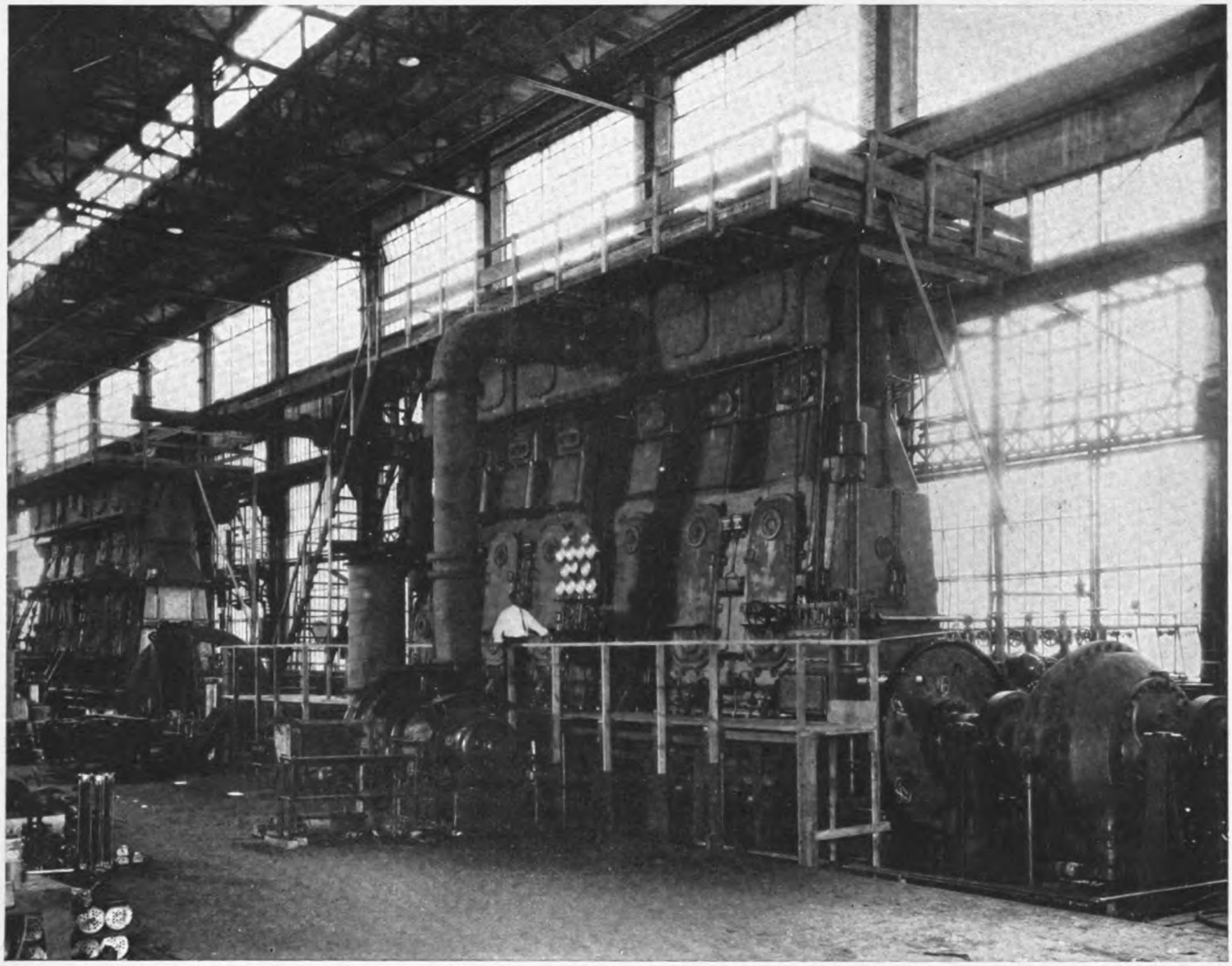

2—4000 S.H.P. DIESEL ON TEST BED

FUEL—.406 lbs. per B. H. P.
(after allowing for power to drive turbo blower)

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FOR THIRTY YEARS BUILDERS OF

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The most modern, the most efficient and the most economical engines for ships

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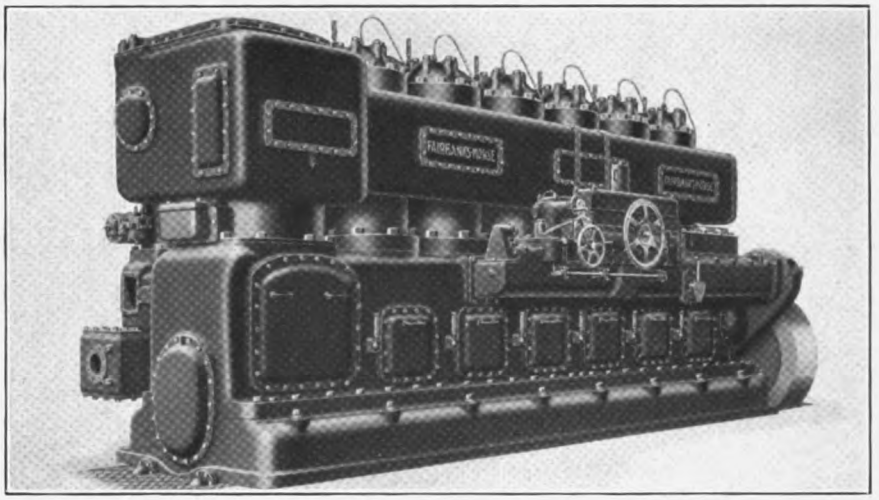
Diesel Direct Drive in Freighter Louis Geraci

One Engine—800 B. H. P.



DESCRIPTION

The power plant installed in the LOUIS GERACI is of the two-cycle airless injection type with built-in auxiliaries. The pistons are oil-cooled. Extreme simplicity of design and sturdy construction together with complete centralization of operating controls characterizes this engine. For the motor-driven auxiliaries, there is also an 18-kilowatt diesel generating set.

Engine

Name of Engine—Fairbanks-Morse; **Year**—1928
Builder—Fairbanks-Morse & Co.; **Cycle**—Two
No. of Cylinders—6; **B. H. P.**—800; **Action**—Single
Injection—Airless; **Scavenging**—Port. Scavenging pump for engines 520 to 800-horsepower
Piston Cooling—Oil for engines 520 to 800 H. P.
R. P. M.—250; **B. H. P. per Cylinder**—133
Wkg. Strokes per Rev.—6; **Lgth. O. A.**—24 ft. ⅜-in.
Height O. A.—10 ft. 6 in.; **Width O. A.**—8 ft. 10 in.
Weight—Including flywheel, 109,600 pound .
Reversing—Direct; **Air Compressor**—Built in

Vessel

Name—Louis Geraci; **Type**—Freighter
Main Drive—Diesel, direct propulsion
Length B. P.—178 feet; **Beam**—28 feet 7 inches
Draft—12 ft.; **No. of Propellers**—One
Fuel Consumption—Lbs. per b. h. p. per hour—0.46
Generators—One of 18 k. w. built by Fairbanks, Morse and driven by Fairbanks, Morse diesel

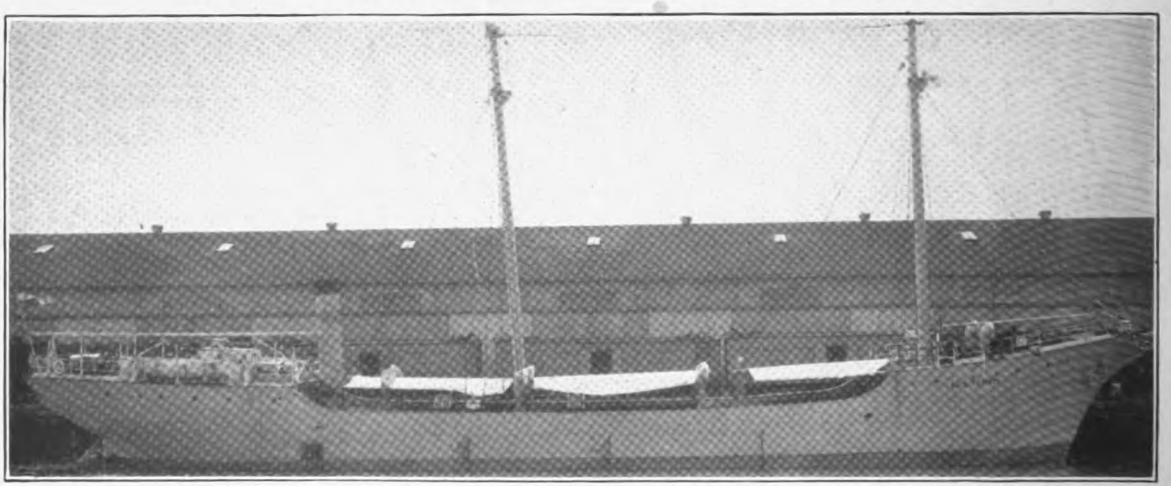
Remarks

The freighter LOUIS GERACI was originally fitted with four steel masts for sails and an auxiliary 4-cycle, air injection German submarine type diesel. Built in Russia about seven years ago, the vessel is now engaged in transporting bananas from British Honduras to Tampa, Fla. She is owned by N. Geraci & Co., Tampa, Fla.

Some of the Standard Sizes of Engines Built

B. H. P.	R. P. M.	Cycle	No. Cyls.	L. O. A feet	L. O. A inches	Height feet	Height inches	Width feet	Width inches	Weight
360	250	2	6	18	10⅛	7	11	6	10	56,000
520	250	2	4	19	8⅞	10	6	8	10	90,400
660	250	2	5	22	2⅞	10	6	8	10	98,300
800	250	2	6	24	0⅜	10	6	8	10	109,600

Also from 25 to 100 b. h. p. engines and diesel generator sets from 20 to 120 k. w.



Single screw diesel freighter LOUIS GERACI—Direct drive—One engine of 800 b.h.p. at 250 r.p.m.

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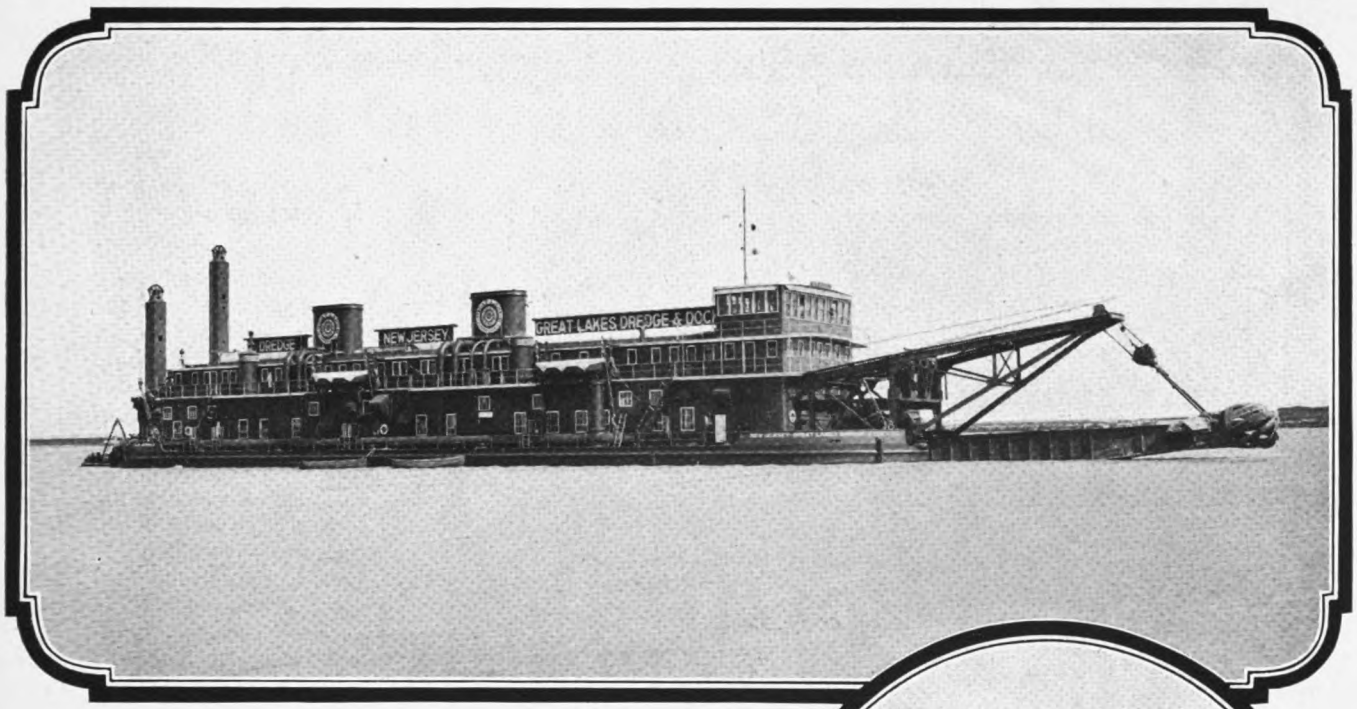


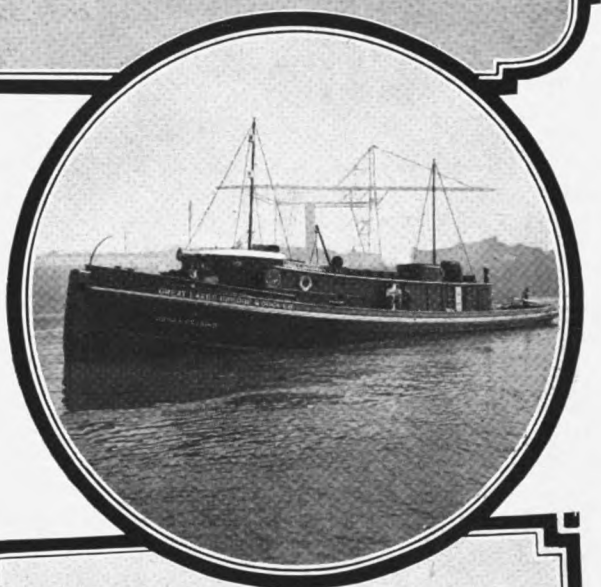
30" Diesel Electric Dredge New Jersey for Great Lakes Dredge and Dock Co. Machinery by Bucyrus Co. Hull and Machinery installation by Manitowoc Shipbuilding Corp.

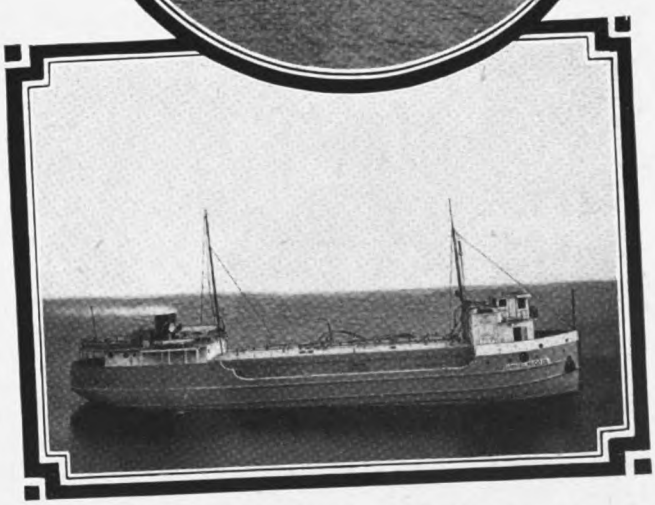
Diesel Propelled Vessels~

Manitowoc-built ships Diesel or Diesel Electric propelled have back of them years of successful experience in designing and building. The same quality accurate workmanship goes into all Diesel equipped jobs—dredge, freighter or tug.

Veteran shipbuilders whose experience includes all types of ships—self-unloaders and car-ferries to tugs and marine auxiliary equipment—we are equipped to meet the requirements of ship owners.

Our engineers will help you work out your plans for Diesel or Diesel Electric propelled jobs—or any other equipment required.





In circle—New Diesel Tug, John F. Cushing, Diesel Engine 1000 B. H. P.

Lower—Daniel McCool, Diesel cement carrying vessel of the Manitowoc Portland Cement Company.

MANITOWOC SHIPBUILDING CORPORATION

Manitowoc, Wisconsin

MANITOWOC

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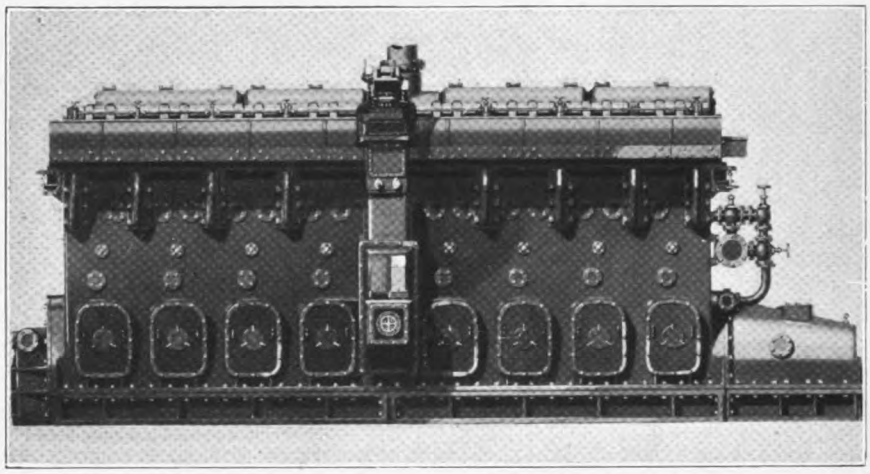
Direct Drive in Small Freighter Liberty

One Engine—500 B. H. P.



DESCRIPTION

This power plant was installed by the owner Capt. Nicholson of Detroit and assistants. The vessel was converted from a side-wheel passenger vessel into a freighter, completed in April 1927. Sliding camshaft-single lever control permits greatest simplicity in one-man control. Fuel consumption is extremely low. It is direct reversible.

Engine

Name of Engine—Bessemer; **Year**—1928
Builder—Bessemer Engine Co.; **Cycle**—4
No. of Cylinders—6; **B. H. P.**—500
I. H. P.—590; **Action**—Single; **Injection**—Solid
Piston Cooling—Air; **Bore**—14 in.; **Stroke**—18 in.
R. P. M.—275; **Piston Speed**—825 feet p. m.
Pressure Brake—85; **B. H. P. per Cylinder**—83
I. H. P. per Cylinder—99; **Mechanical Eff.**—85%
Length O. A.—21 ft. 9 in.; **Height O. A.**—10 ft. 4 in.
Width O. A.—2 ft. 11 in.; **Wt. one Engine**—70,000
Reversing—Direct Reversible, sliding camshaft
Air Compressors—Motor Driven

Vessel

Name—Liberty, originally side-wheel passenger vessel City of the Straits, converted
Type—Single screw small Great Lakes freighter
Main Drive—One diesel engine direct connected
Length B. P.—231 ft.; **Beam**—38 ft.; **Depth**—14 ft.
Draft—11 ft.; **Speed**—11.6 miles per hour
No. of Propellers—One; **Fuel Capacity**—51½ tons
Fuel Consumption—Lb. per b.h.p. per hr.—0.41
Generators—Two 25 k.w. at 420 r.p.m. direct connected. Present ones to be replaced by new Bessemer units.

Remarks

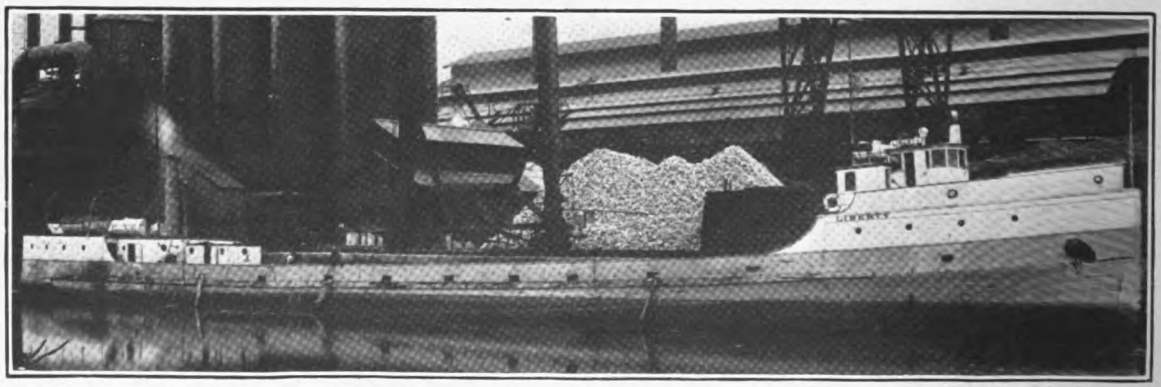
The freighter LIBERTY was originally the side-wheeler CITY OF THE STRAITS converted in April 1927 into a small Lakes freighter. The whole task of conversion, including installation of the diesel drive, was carried out by the owner of the LIBERTY, Capt. Wm. Nicholson of Detroit and his assistants.

The LIBERTY is at present engaged in regular runs between Detroit and Cleveland, carrying a cargo of steel from the Corrigan McKinney Steel company in Cleveland to Detroit and on the return run a cargo of scrap metal.

Some of the Standard Sizes of Engines Built

B. H. P.	R. P. M.	Cycle	No. Cyls.	Dia. Crankshaft	Weight
500-675	275-375	4	6	10 in.	70,000
660-900	275-375	4	8	10 in.	81,500
700-900	260-325	4	6	11¼ in.	99,000
930-1200	260-325	4	8	11¼ in.	126,000
930-1125	250-300	4	6	12¾ in.	120,000

Also from 125 to 300 b. h. p. direct reversible engines and diesel generating sets of 25, 40, 50, 75, 110 k. w.



Diesel direct drive in small freighter LIBERTY—Two auxiliary generating sets—Main Drive Engine 500 B. H. P.

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Where power and profits go hand in hand

THAT'S where Bessemer Diesel engines prove their worth. In commercial marine service of every kind from the small ferry or fishing vessel to the large cargo carrier you will find Bessemer Diesels playing a stellar role. It's their performance in that kind of service which has proved their worth.

Bessemers have every feature that makes a marine power plant outstanding. They are simple, easy to operate, over-strength yet not over-weight, economical in both operation and maintenance, smooth and quiet running, thoroughly dependable at all times, and long-lived.

For your marine power requirements where power and profits go hand in hand you'll find a Bessemer Diesel engine an "active partner".

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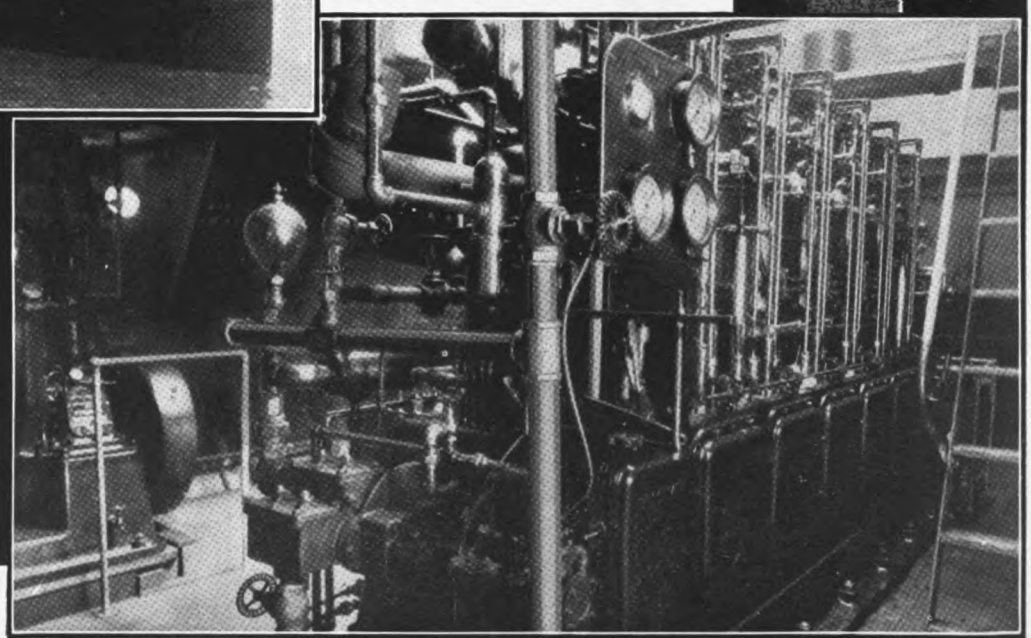
Washington, D.C, 1109 National Press Bldg.
New Orleans, La., 604 Southern Bldg.
Chicago, Ill. A McMillan Los Angeles, 727 Standard Oil Bldg.
Pittsburgh, Pa., 815 Bessemer Bldg.
San Francisco, V. A. Stout, 806 Fife Bldg.

The Green Line freighter "Lillian Anne", owned by the Chesapeake & Delaware Steamboat Co., powered with a direct reversible Bessemer Diesel engine of 350 H.P. at 277 R.P.M. The "Lillian Anne" is 141.5' over all, 27.1' beam, 8' draft, and on her trial run made a speed of 12.6 M. P. H. over a measured course.



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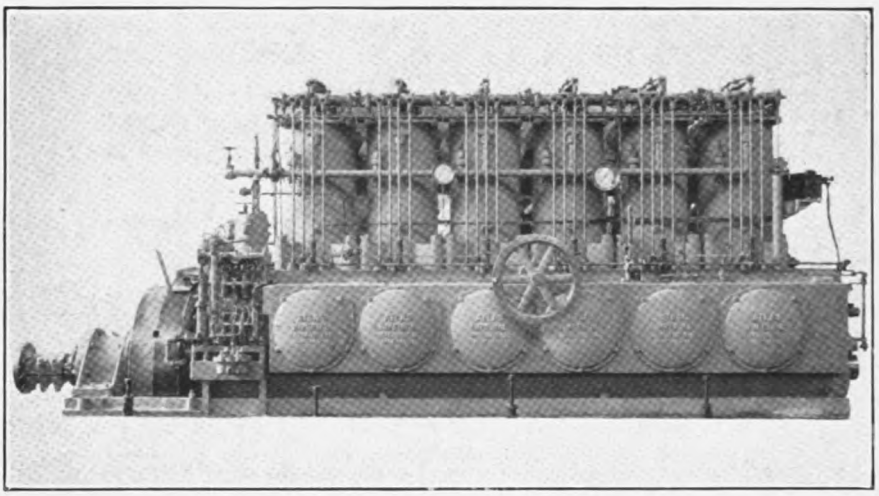
Diesel Direct Drive in Fishing Boat Orient

One Engine—350 B.H.P.



DESCRIPTION

The power plant in the ORIENT is of the direct reversible, solid injection type, equipped with an automatic air brake on the flywheel. This brake is operated in connection with the reversing mechanism, bringing the engine to a quick stop when maneuvering. Complete reversal within 5 seconds is possible. The ORIENT is a steel fishing boat.

Engine

Name of Engine—Atlas-Imperial; **Year**—1928
Builder—Atlas-Imperial Diesel Engine Co.
Cycle—Four; **No. of Cylinders**—6; **B.H.P.**—350
Action—Single; **Injection**—Solid
Scavenging—None; **Piston Cooling**—Air
Bore—12½ in.; **Stroke**—16 in.; **R.P.M.**—275.
B.H.P. per Cyl.—58 1/3; **Mechanical Eff.**—75%
Stroke to Bore—1.28; **Piston Speed**—733 f. p. m.
Length O. A.—16 ft. 8 in.; **Height O. A.**—8½ ft.
Width Overall—4 ft. 5 in.; **Weight**—41,000 lbs.
Reversing—Direct reversible, auto. air brake
Air Compressors—None; Solid injection

Vessel

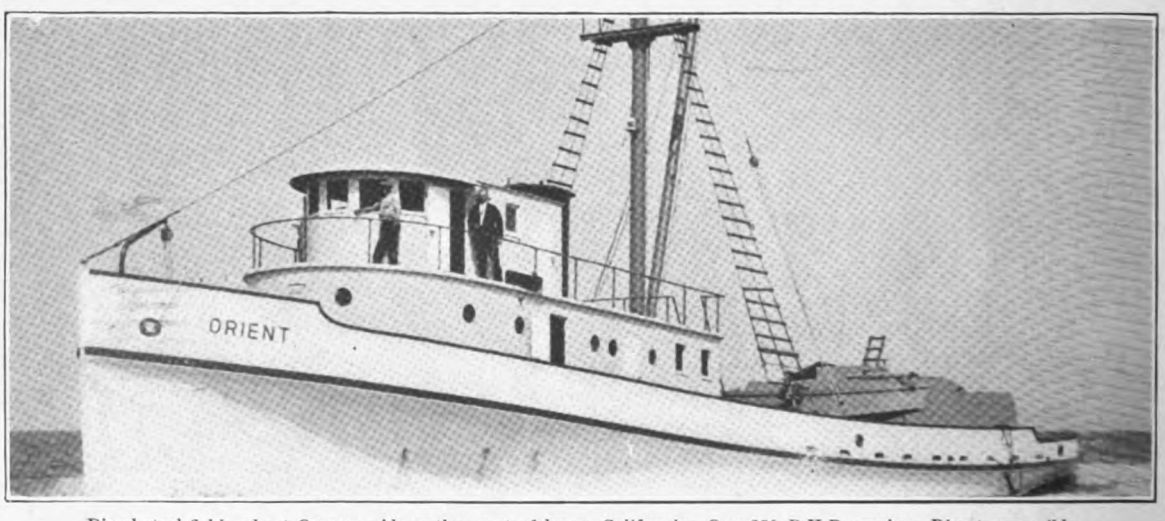
Name—Orient; **Type**—Steel fishing vessel
Main Drive—Direct connected; **L. B.P.**—112½ ft.
Length Overall—112 ft. 6 in. **Beam**—25 feet
Depth—12 feet; **Capacity Bait Wells**—80 tons
Capacity of Bait Tanks—50 tons of water
Speed—10¾ knots; **No. of Propellers**—One
Fuel Consumption—Lbs. per b.h.p. per hour—0.41
Radius Without Refueling—4000 miles

Remarks

The ORIENT is the first all-steel fishing vessel built and used on the California coast. The boat is operated in the tuna and albacore fishing on the lower California coast. The ORIENT grew out of a demand for a larger boat with a greater radius of action. The requirements of this type of boat, such as working platform, bait wells and bait tanks placed well aft have been met in the construction of the ORIENT. The stowage space for cargo is placed aft also for quick stowing.

One of the advantages of the steel as compared with the wood fishing boat is the fact that the nature of the boat demands a shaft of great length and in the steel-built boat, there is very little possibility of misalignment. The shafting in the steel hull, after proper alignment will deliver its full thrust horsepower to the propeller.

The ORIENT was built from the design of G. B. Newby, naval architect, by the Los Angeles Shipbuilding and Drydock Corp., Los Angeles.



Diesel steel fishing boat ORIENT—Along the coast of lower California—One 350 B.H.P. engine—Direct reversible

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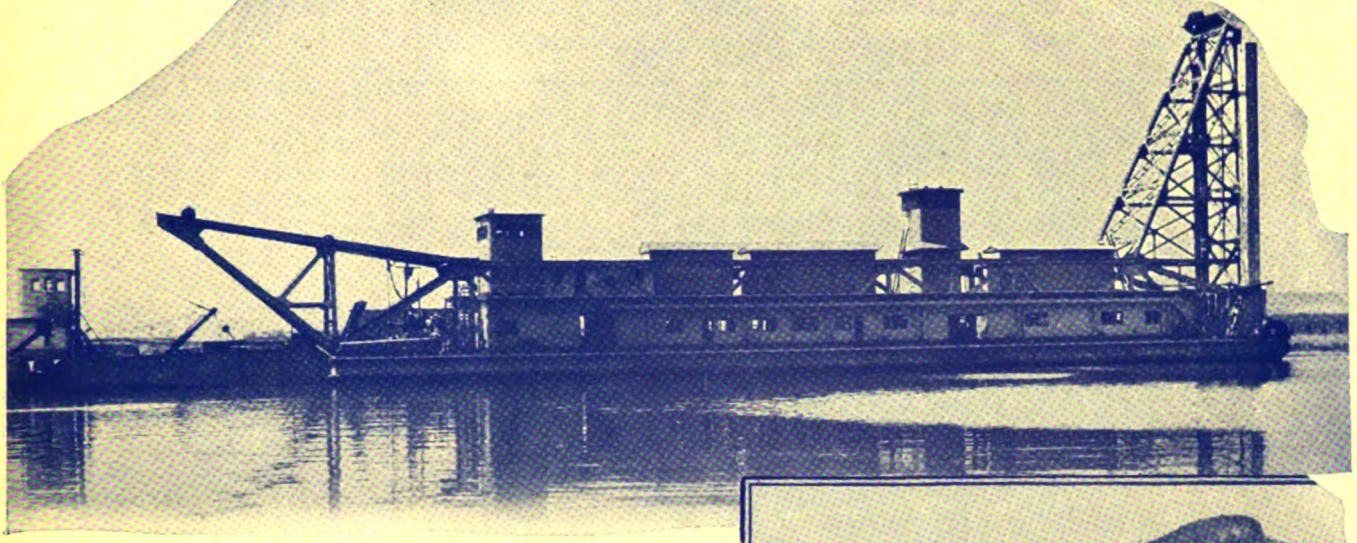
DIESEL ELECTRIC



The 2200 kw. hydraulic dredge Las Cruces, built by the Ellicott Machine Corporation, Baltimore, Md.

A cut in the Panama Canal
from Wide World Photos.

The United States Government's Choice

THE United States Government, in building a powerful hydraulic dredge for the Panama Canal, specified Diesel electric power. This choice was based upon the consideration of such factors as reliability, maintenance and economy of operation. Westinghouse, with years of experience in the successful design and manufacture of this class of marine apparatus, supplied the generators, motors and control.

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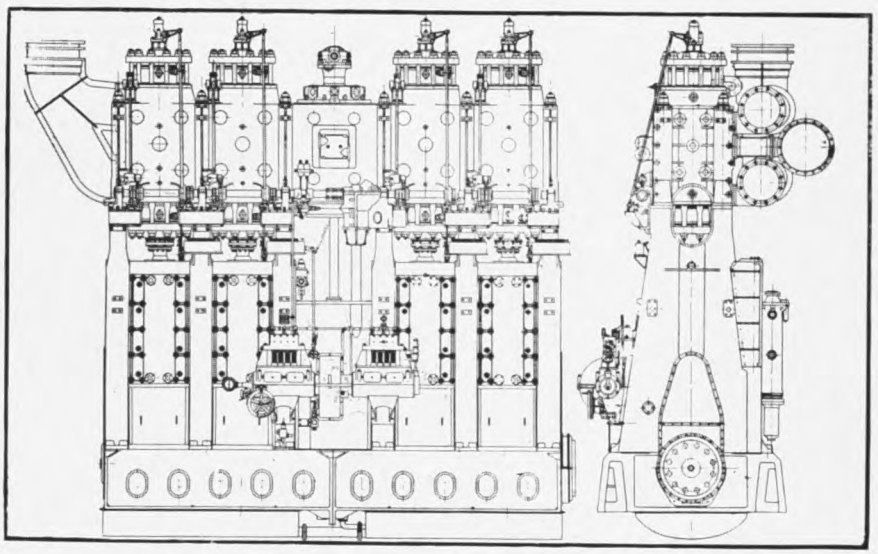
Diesel Direct Drive in Freighter, New Orleans

One Double Acting Engine—4000 B. H. P.



DESCRIPTION

One engine of this size and type direct connected to the propeller shaft is to be installed in each of the 9300-ton deadweight shipping board freighters, NEW ORLEANS and WICHITA. This engine is of crosshead construction, has four cylinders and works on the two-stroke cycle with air injection and port scavenging. It is of sufficient power to give the vessel a speed of 12½ knots.

Engine

Name of Engine—Hamilton M. A. N.; 1928
Builder—The Hooven, Owens, Rentschler Co.
Cycle—Two; **No. of Cylinders**—4; **I. H. P.**—5000
B. H. P.—4000; **Action**—Double acting
Injection—Air; **Scavenging**—Port scavenging
Piston Cooling—Fresh water; **Bore**—27½ inches
Stroke—47¼ in.; **Piston Speed**—867 f. p. m.
R. P. M.—110; **Pressure Ind.**—85 pounds
Pressure Brake—69 lb.; **B. H. P. per Cyl.**—1000
I. H. P. per Cyl.—1250; **Mechanical Eff.**—81%
Stroke to Bore—1.718; **Wkg. Strs. per Rev.**—8
Length O. A.—32 ft. 0 in.; **Height O. A.**—26 ft.
Width O. A.—16 ft. 0 in.; **Weight**—720,000 lb.
Lb. per B. H. P.—180; **Per I. H. P.**—144 lb.
Reversing—By air, with sliding cams
Air Compressor—Three stage, vertical, attached

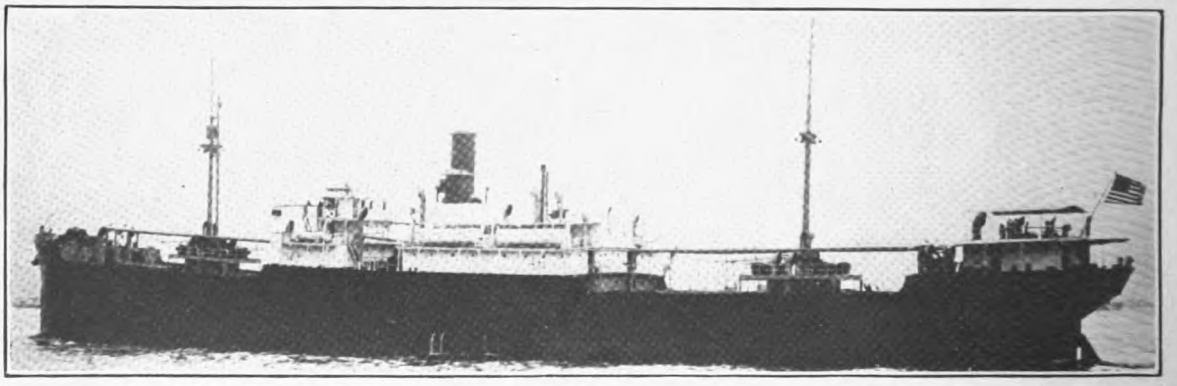
Vessel

Name—New Orleans; **Type**—Ocean freighter
Main Drive—Single screw, direct, D. A. diesel
Length B. P.—395 ft. 6 in.; **Beam**—55 ft.
Depth—34 ft. 11 in.; **Draft**—27 ft. ¼-in.
Displacement—13,000 tons; **D.Wt.**—abt. 9300 tons
Speed—12½ knots; **No. of Propellers**—One
Fuel Cap.—760 tons; **Fuel per Day**—18 tons
Fuel—Pounds per B. H. P. per hour—0.44
Radius Without Refueling—14,000 miles
Generators—Two of 340 kilowatts each direct connected to diesel engines

Remarks

According to bids received the contract to convert the freighters NEW ORLEANS and WICHITA to diesel drive goes to the Federal Shipbuilding & Dry Dock Co. for $1,125,000 for converting both vessels. These two vessels are a part of the program of eight vessels in which the installation of four different makes of engines is now under way.

The engine shown and described on this page is of the M. A. N. type as built by the Hooven, Owens, Rentschler Co. The framing consists of bedplate, independent housings and cylinder block design, all held together by tie rods located at the corners of the cylinders and carried through to the bottom of the bedplate.



M. S. Seminole converted last year. The New Orleans and Wichita are freighters of about same size

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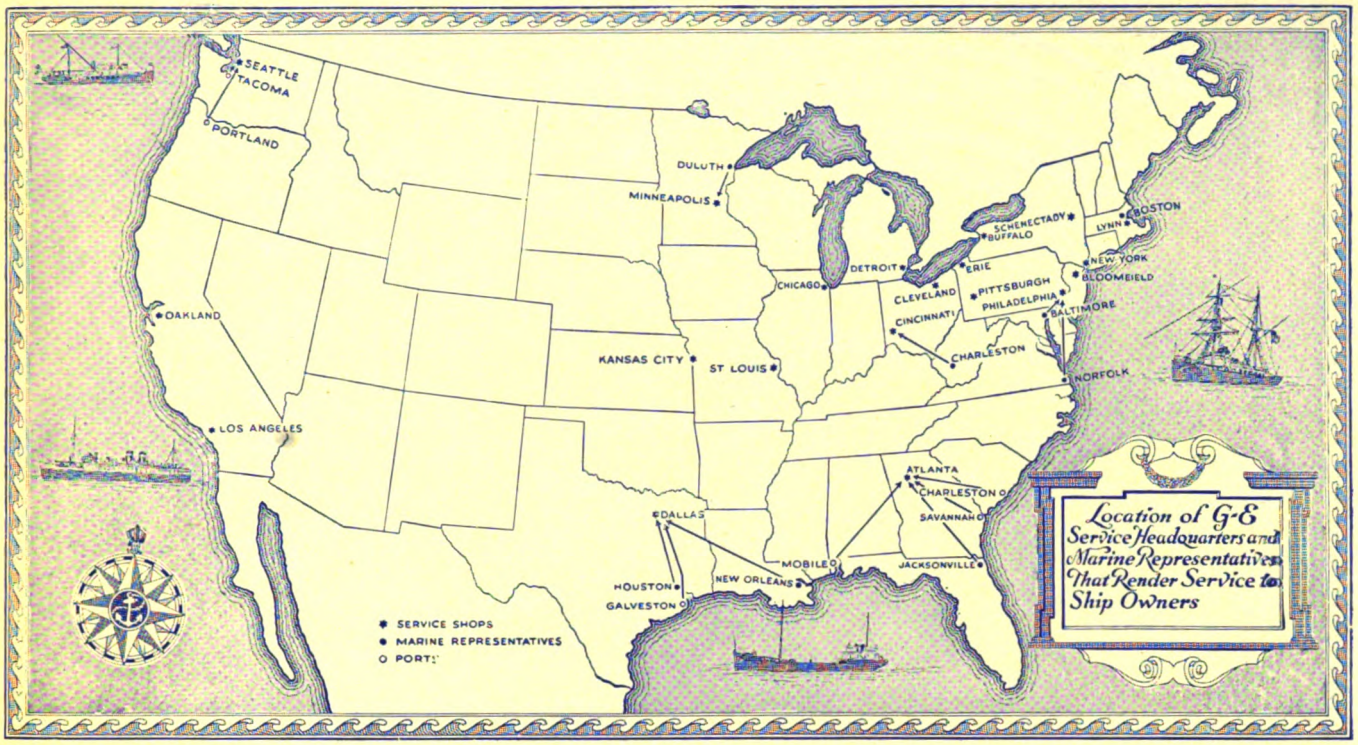

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At each Service Shop there is a large corps of expert service men ready day and night, Sundays and holidays, to restore your equipment to factory standards. These men will service your generators, generating sets, propulsion motors and control, or the electric equipment for windlasses, winches, hoists, pumps, fans, and other auxiliaries and devices. This work can be done either in our shops or aboard ship if, because of size or lack of time, the apparatus cannot be put ashore.

For reliable and complete repairs or reconditioning and modernizing of marine electric equipment, get in touch with General Electric Service Shops or marine representatives in the United States. In other parts of the world, representatives of the International General Electric Company will assist you.

91-21

GENERAL ELECTRIC

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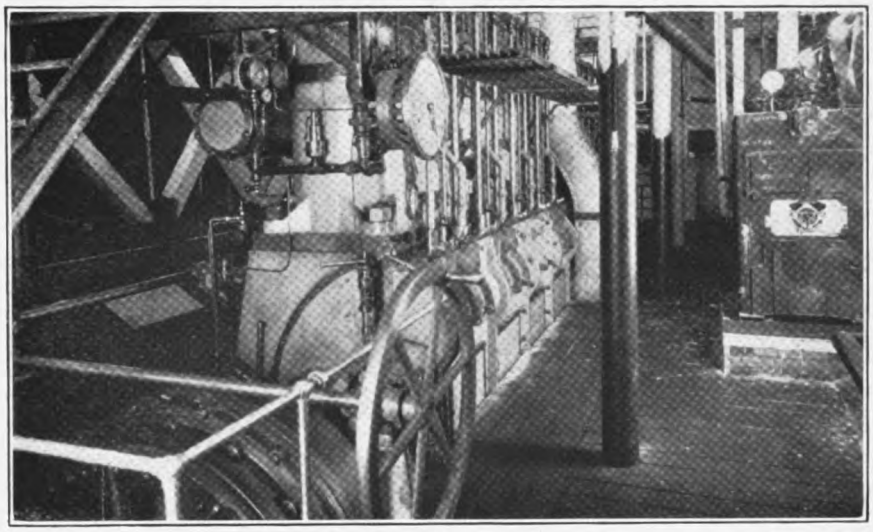
Diesel Direct Drive in Ferryboat Bainbridge

One Engine—800 B. H. P.



DESCRIPTION

The engine is a non-reversing unit with a one-way clutch carried in an extension base at each end. The two clutches are interconnected so that when one is engaged, the other is automatically released. Control is by a hand wheel at the operating station. Reversing or maneuvering is made possible by engaging the forward or after propeller, as desired.

Engine

Name of Engine—Washington-Estep; **Year**—1928
Builder—Washington Iron Works
Cycle—4; **No. of Cylinders**—8; **B. H. P.**—800
I. H. P.—930; **Action**—Single; **Injection**—Solid
Scavenging—None; **Piston Cooling**—None
Bore—17 in.; **Stroke**—24 in.; **R. P. M.**—190-200
Piston Speed—760-800 feet per minute
Pressure Indicated—84.7; **Pressure Brake**—72.9
B. H. P. per Cyl.—100; **I. H. P. per Cyl.**—116.2
Mechanical Efficiency—86%; **Stroke to Bore**—1.41
Wkg. Strokes per Rev.—4; **Lgth. O. A.**—41 ft. 6 in.
Height O. A.—12 ft. 8⅞ in.; **Width**—6 ft. 7 in.
Weight—200,000 lbs.; **Lbs. per b. h. p.**—250
Reversing—No. By means of clutch at both ends
Air Compressor—Single stage, one on engine and one motor driven auxiliary air compressor

Vessel

Name—Bainbridge; **Type**—Ferryboat
Main Drive—Diesel, clutch connected to propeller shafts at each end of engine
Length B. P.—177.75 ft.; **Beam**—55.2 ft.
Depth—14.9 ft. **Draft**—11 ft.
Gross Tons—540; **Speed**—12 knots
No. of Propellers—Two; one at each end of vessel
Fuel Consumption—Llbs. per b. h. p. per hour —0.39

Remarks

The ferryboat BAINBRIDGE operates across Puget sound, between Seattle and Port Blakely. The Bainbridge was built in the spring of 1928 by the Lake Washington Shipyards of Houghton, Wash., for the Kitsap County Transportation Co. of Seattle and is probably the largest single-engined, double-ended diesel ferryboat afloat.

The Kitsap County Transportation Co. decided on a double clutch, double-ended type of drive for the vessel due to the satisfactory service of their ferry KITSAP which has been in operation for the past three years. The Kitsap is equipped with a similar installation except that the engine is only 600 brake horsepower while the BAINBRIDGE is powered with an 800 brake horsepower engine.

The power plant of the BAINBRIDGE, being the non-reversing unit with a one-way clutch carried in an extension base at each end, permits positive reversing as the engine always turns one way.

Diesel ferryboat BAINBRIDGE—Seattle and Port Blakely—One 800 B.H.P. engine—Clutch connected at each end of shaft

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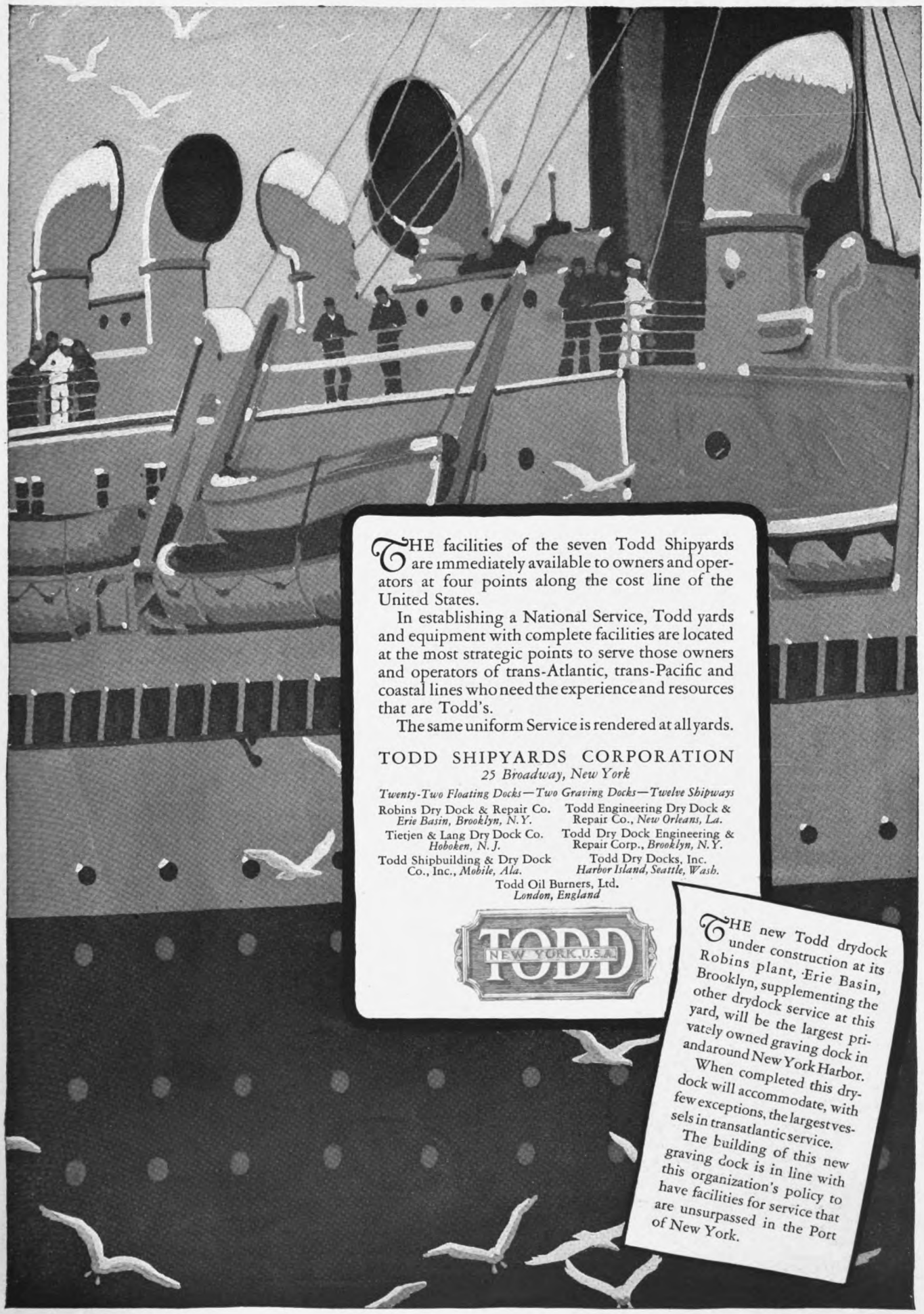

THE facilities of the seven Todd Shipyards are immediately available to owners and operators at four points along the cost line of the United States.

In establishing a National Service, Todd yards and equipment with complete facilities are located at the most strategic points to serve those owners and operators of trans-Atlantic, trans-Pacific and coastal lines who need the experience and resources that are Todd's.

The same uniform Service is rendered at all yards.

TODD SHIPYARDS CORPORATION
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TODD
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THE new Todd drydock under construction at its Robins plant, Erie Basin, Brooklyn, supplementing the other drydock service at this yard, will be the largest privately owned graving dock in and around New York Harbor.

When completed this drydock will accommodate, with few exceptions, the largest vessels in transatlantic service.

The building of this new graving dock is in line with this organization's policy to have facilities for service that are unsurpassed in the Port of New York.

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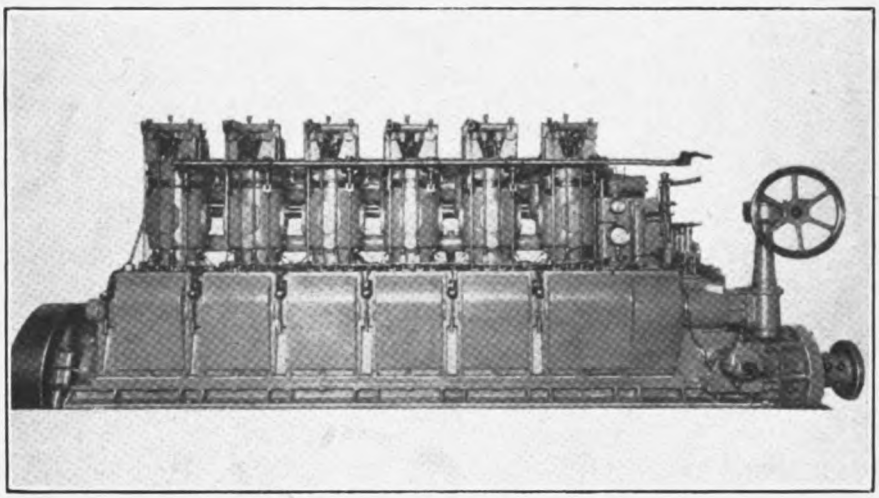
Diesel Gear Drive in Tug, Gerald A. Fagan

One Engine—330 B. H. P.



DESCRIPTION

One engine of this size and type is direct connected to the propeller shaft through a reduction gear having a ratio of 2.4. This engine is of the four-cycle type with mechanical hydraulic injection and is of heavy duty for marine service. There are six cylinders. Reversing is done by means of shifting the camshaft hydraulically.

Engine

Name of Engine—Standard; **Year**—1928
Builder—Standard Motor Construction Co.
Cycle—4; **No. of Cylinders**—6; **B. H. P.**—330
I. H. P.—388; **Action**—Single; **Injection**—Solid
Piston Cooling—Air; **Bore**—12 in.; **Stroke**—17 in.
R. P. M.—Engine 300; **R. P. M.**—Propeller 125
Piston Speed—850 ft. p. m.; **Pressure Indicated**—
Pressure Brake—80; **B. H. P. per Cyl.**—55
I. H. P. per Cyl.—64; **Mechanical Efficiency**—85%
Stroke to Bore—1.41; **Wkg. Strokes per Rev.**—3
Length O. A.—22 ft. 5¾ in.; **Height O. A.**—7 ft. 1 in.
Width O. A.—5 ft. 5 7/16 in.; **Weight**—56,000 lb.
Lbs. per B. H. P.—169—**per I. H. P.**—144
Reversing—Direct by shifting camshaft
Air Compressor—Attached; starting air only.

Vessel

Name—Gerald A. Fagan; **Type**—Tow Boat
Main Drive—Diesel with reduction gear
Length B. P.—88 ft.; **Beam**—20 ft. 0 in.
Displacement—290 tons; **No. of Propellers**—One
Speed—8½ knots; **Fuel Capacity**—140 bbls.
Fuel Consumption—Lb. per b. h. p. per hr.—0.45
Fuel, Tons per Day—1½; **Radius**—17 days
Generators—One 4½ k. w. Direct connected to Fairbanks Morse diesel engine
Reduction Gear—Ratio 2.4. By Niles Gear Co.

Remarks

This is an interesting application of a fairly high-speed diesel engine to an efficient towboat drive by means of reduction gears. The engine is permitted to turn at its most favorable rate of revolutions per minute which in this case is 300 while at the same time the propeller for full speed of the engine only turns at a rate of 125 revolutions per minute which is considered about the ideal speed for a towboat propeller.

The tow boat shown here formerly had a steam drive. The work of removing the old steam engine and boiler and installing the diesel engine and reduction gear was done by the Kingston Dry Dock & Construction Co. This tug is operated by the Marine Transit Corp. and is used in towing between New York and Albany.

Towboat Gerald A. Fagan fitted with 330-horsepower Standard diesel engine connected through reduction gearing

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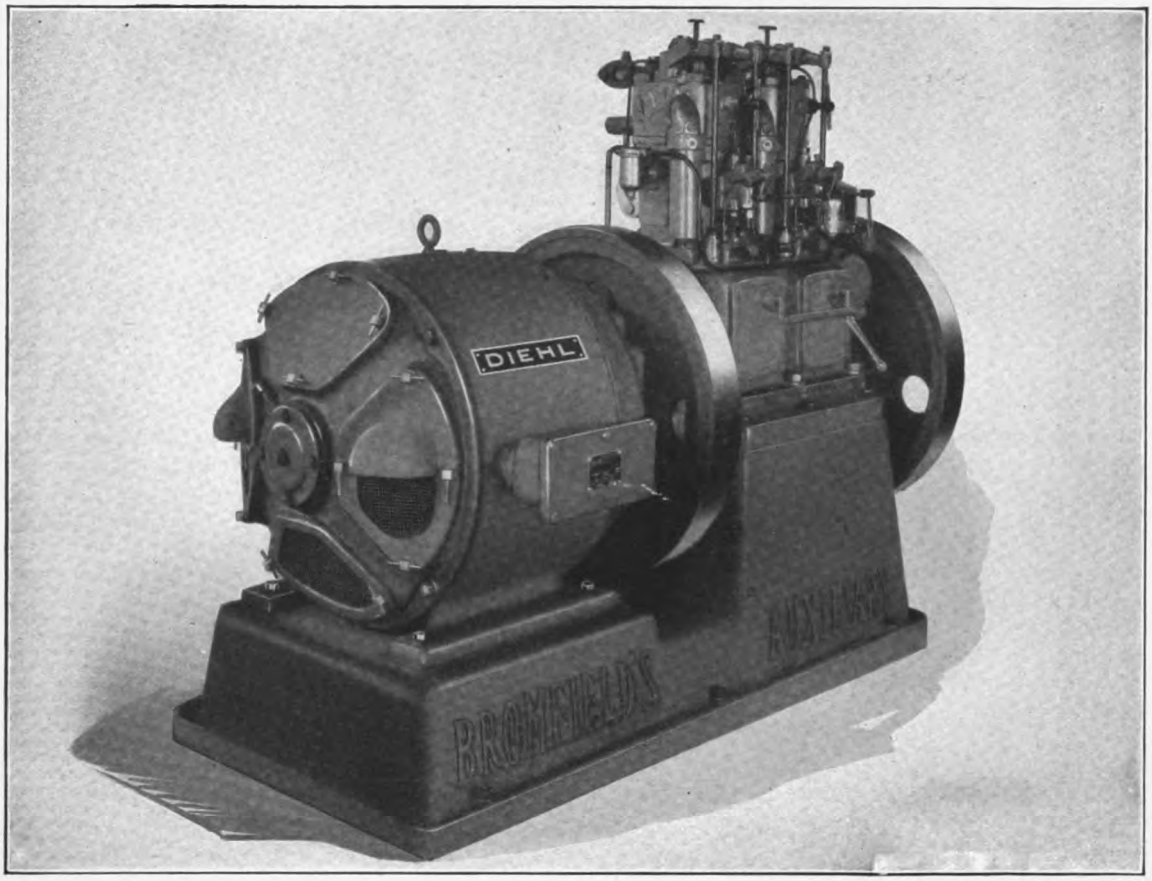

Diehl L-16 10 K. W. 115 Volt D. C. Marine Generator

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Direct connected to Colo-Diesel engine for lighting and auxiliary power on trawlers now being built for the Massachusetts Trawling Company by the Bethlehem Shipbuilding Company, Quincy, Mass.

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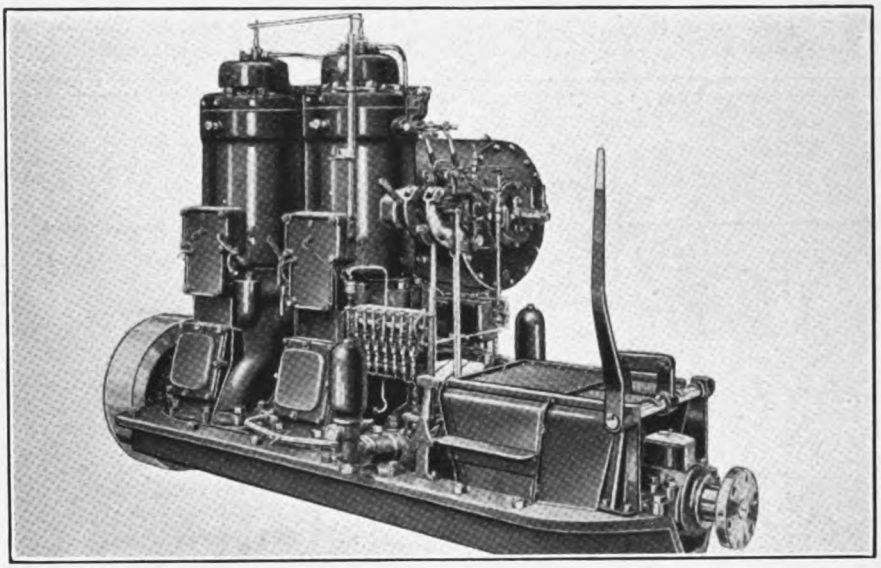
Diesel Direct Drive in Fishing Vessel El Dorado

One Engine—150 B. H. P.



DESCRIPTION

This engine is of two stroke cycle, with low compression, surface ignition, and solid injection. It is of the trunk piston crankcase compression type and is direct reversible in sizes above 120 brake horsepower. No air compressors are found on this installation. Reversing is accomplished by direct impulse mechanism. Injection is solid with crankcase scavenging and with one working stroke per revolution.

Engine

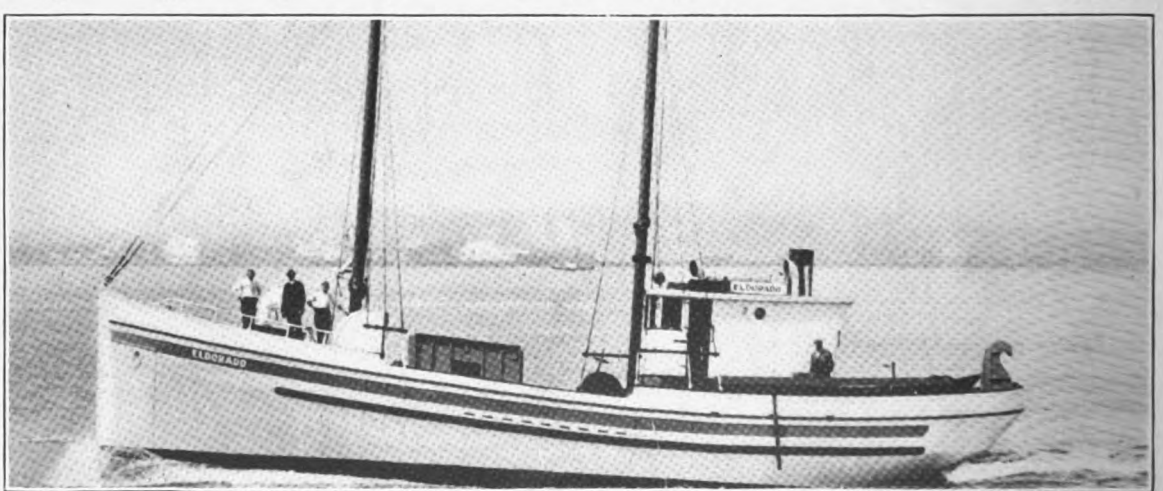
Name of Engine—Bolinders; **Year**—1928
Builder—Bolinders Co. Inc.
Cycle—Four; **No. of Cylinders**—Two; **B. H. P.**—150
Action—Single; **Injection**—Solid
Scavenging—Crankcase; **Piston Cooling**—None
Bore—15 in.; **Stroke**—16¼ in.; **R. P. M.**—300
Pressure Indicated—42.5; **Pressure Brake**—33 lbs.
B. H. P. per Cylinder—75; **Stroke to Bore**—1.08
Working Strokes per Revolution—One
Lgth. O. A.—11 ft. 2¾ in.; **Ht. O. A.**—6 ft. 6¾ in.
Width Overall—3 ft. 6⅞ in.; **Weight**—18,000 lbs.
Reversing—Direct reversible by impulse
Air Comp.—None; **Starting**—Surface ignition
Auxiliaries—70-horsepower, Bolinders oil engine direct connected to electric generator

Vessel

Name—El Dorado; **Type**—Fishing Vessel
Main Drive—Direct connected marine oil engine
Length B. P.—74 ft.; **Beam**—18 ft.
Depth—9 ft.; **Speed**—10 knots
No. of Propellers—One
Fuel Consumption—Lbs. per brake horsepower per hour—0.46.

Some of the Standard Sizes of Engines Built

B. H. P.	R. P. M.	Cycle	No. Cyls.	L. O. A feet	L. O. A inches	Height feet	Height inches	Width feet	Width inches	Weight
180	400	2	4	14	6	5	3	3	1	20,000
240	375	2	4	15	7	5	7½	3	3	23,500
300	300	2	4	17	7	6	7	3	10½	35,500
400	275	2	4	19	8	7	4½	4	3	47,500
600	200	2	4	24	5	10	6	5	11	113,000



Diesel direct drive in fishing vessel El Dorado—Electric generator direct connected to marine oil engine

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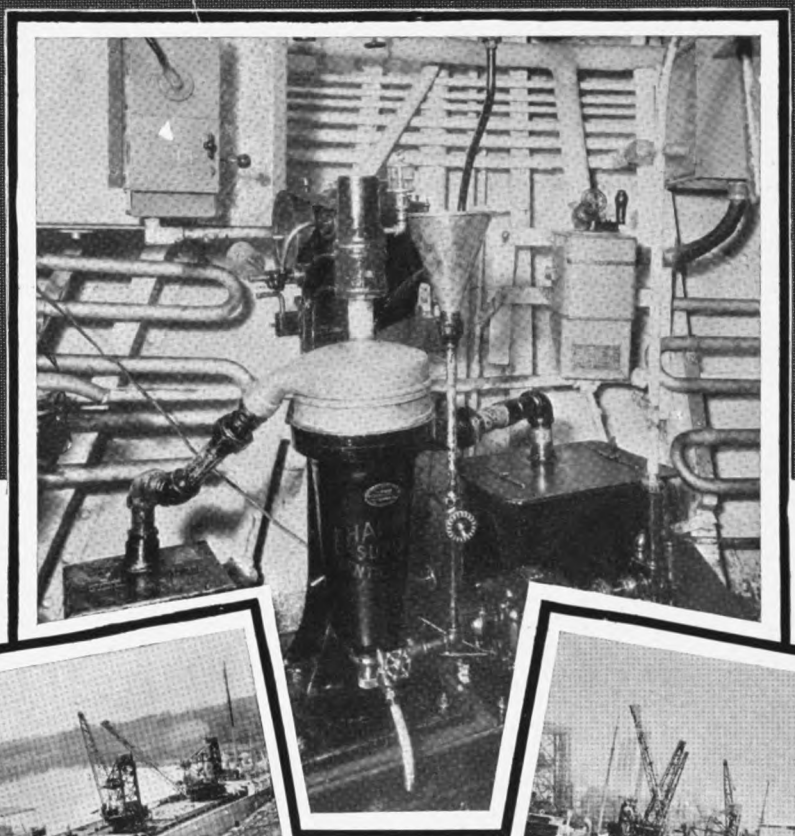
ON THE "STEEL" MOTORSHIPS



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STEEL MOTOR

These Great Lakes ships—owned by the U. S. Steel Products Company and used for carrying steel and paper—are permanently protected against dirty fuel and lubricating oil by their installations of Sharples Oil Purifiers.

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For clean, safe oil—there is no substitute for the
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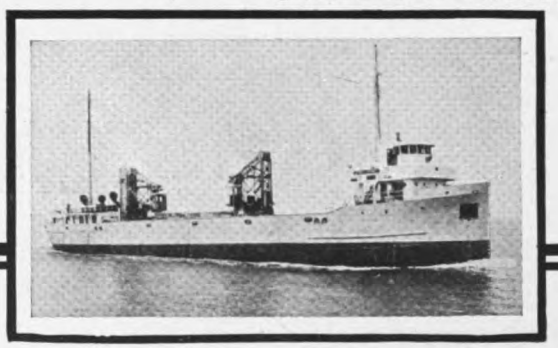

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At eleven o'clock every Saturday morning

Promptly at 11 o'clock every Saturday morning the M. S. "Bermuda"—powerful Diesel-engined 20,000 gross ton flagship of the Furness Bermuda Line—leaves her New York dock for Hamilton, Bermuda. Promptly at 10 A. M. every Tuesday, she starts her return trip to New York. Since January, 1928, regardless of weather, this magnificent ship has made more than thirty-five round trips on schedule, with no delays because of engine trouble.

Since January the M. S. "Bermuda" has used no other fuel than "Standard" Diesel Fuel Oil—clean and uniform in high quality—always reliable in results.

Such a record for regular and continuous operation with "Standard" Diesel Fuel Oil is not unusual. More than one hundred and twenty-five other vessels are stepping up their power and saving time with this fuel. Of the larger ships, the Swedish-American "Gripsholm," the new trans-Atlantic liner "Kungsholm" and the 23,500 gross ton Italian Line "Saturnia" are only a few of the many whose owners have selected "Standard" Diesel Fuel Oil as the proper fuel to assure the mechanical efficiency and dependable operation of their Diesel-powered ships.

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STANDARD

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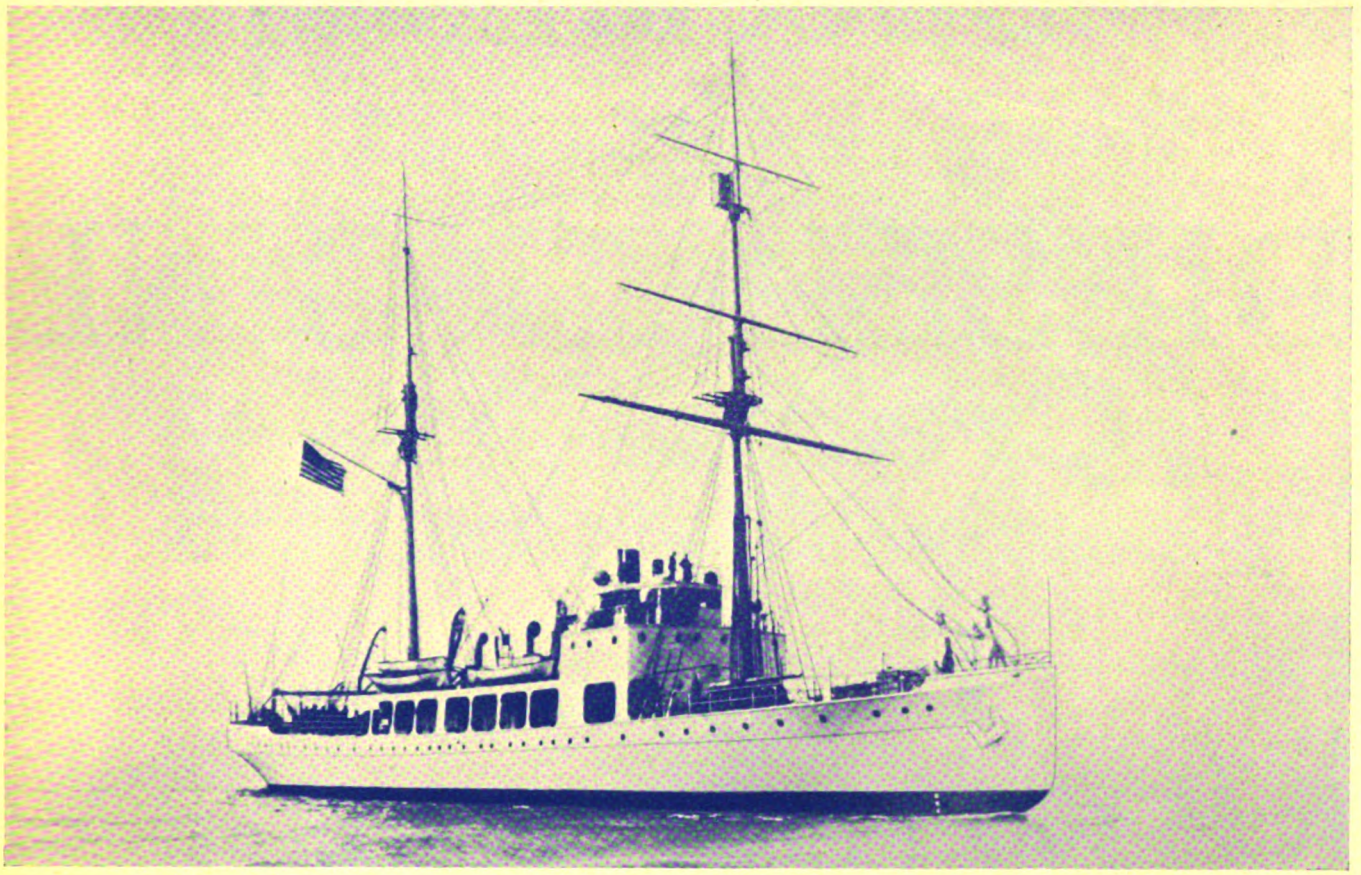

8 Warren Pumps in Arctic Service

Away from its base weeks and sometimes months at a time, diesel-equipped Coast Guard Cutter Northland cannot risk the safety of its engineering equipment by the failure of pumps at sea . . . pumping equipment *must* be dependable.

Eight motor driven Warren Centrifugals, including engine cooling water circulating pumps and fuel oil tank heating water circulating pumps, have given efficient, dependable service on every cruise.

For more than 30 years, Warren Pumps have served on the finest ships in every class . . . have held the confidence of marine engineers because of their steady, reliable service under all conditions.

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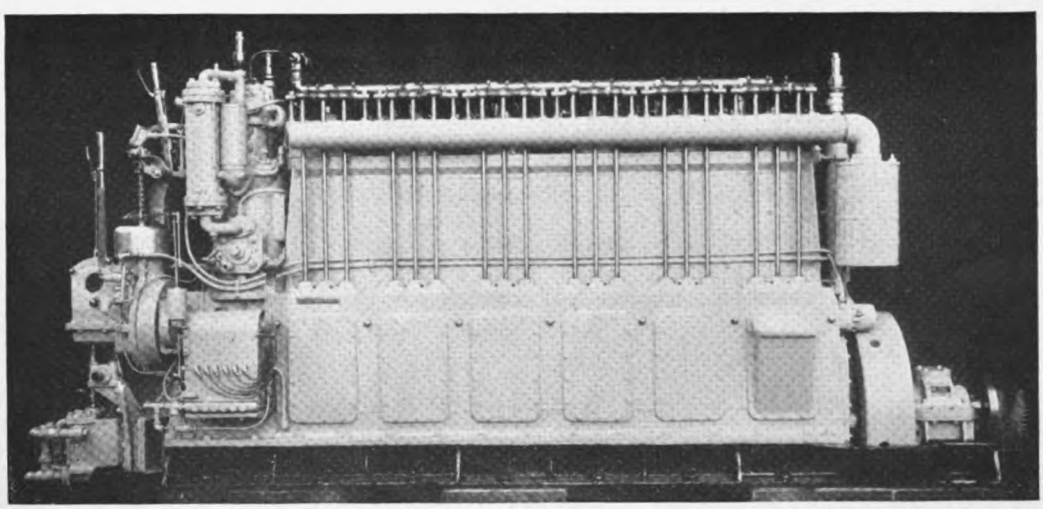
Winton Power and Economy

THE steam power plant in the towboat Aubrey, owned by the American Construction Company, Cleveland, Ohio, was replaced in April, 1928, by a Winton-Diesel Engine.

Since then the boat has done 25% more work in the same amount of time, with two less men in the crew. Four month's continual operation without refueling. Fuel cost reduced two-thirds. Demonstrated economy such as this shows how Winton-Diesel Engines contribute to profitable towboat operation.

THE WINTON ENGINE COMPANY
Cleveland, Ohio, U. S. A.



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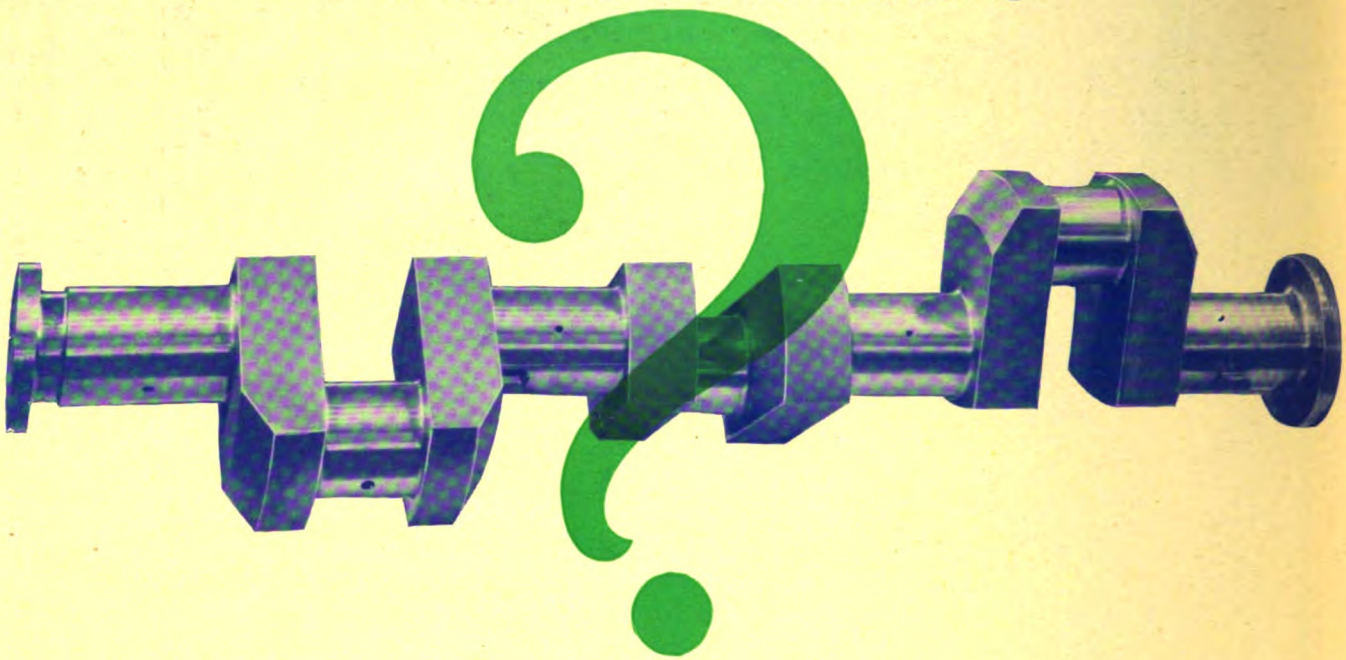
What "Tifoco" Means in a Crankshaft



It Means—

THAT every Ingot or billet is selected from the cream of the mill and cold sawn before forging —— this to permit inspection for hidden flaws.

THAT reduction is carefully watched and a 30% crop from the top and 5% crop from the bottom is religiously adhered to, regardless of increased production costs.

THAT no **Tifoco** shaft is forged under a steam hammer. Hydraulic presses are used exclusively.

THAT there is always a liberal margin over customers' specifications.

THAT every finished crankshaft is ground on the shafts and the pins turned with a Weber patented tool and polished.

THAT all pins are absolutely parallel with the journals, within a tolerance of 0.001½" unless specified closer.

THAT all marine shafts are forged to American Bureau and Lloyds requirements.

THAT if you quote **Tifoco** in your Diesel engine specifications you will have the finest crankshaft it is possible to obtain.

We also specialize in making intricate pistons, either rough or finished machined.

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Turbo-Electric Liner Viceroy of India Launched Sept. 15, at Alexander Stephen & Sons, Ltd., Linthouse, England

British Maritime Affairs Improve, Shipbuilding is Fairly Active

By Vincent Delport

European Manager of Marine Review

DURING the summer months, shipbuilding activities in Great Britain and Ireland continued fairly satisfactory in comparison with last year's business, although the tonnage of new orders placed still leaves much to be desired. Obviously, the more progressive steamship companies are ordering modern vessels in order to maintain their leading position, but a large number of freight carriers still exist which are of an obsolete design, and it has been estimated that there is in the world a surplus of about 40 per cent of carrying capacity. This figure takes account of the fact that present-day vessels are faster than the old ones, and that there have been great improvements in facilities and methods of loading and discharging, thus enabling vessels to complete their journeys quicker. The depression in shipbuilding is not limited to British undertakings only, as reports from Germany are to the effect that the industry there is facing a grave crisis, and that in consequence of the heavy cost of materials and labor, German yards can no longer compete successfully against Britain for foreign contracts in the field of shipping.

The keel of the future White Star giant liner has been laid at Belfast, Ireland, but a great deal yet remains to be decided as regards detailed plans and machinery. It is understood that plenty of time will be given for the maturing of the plans of the vessel, and it is expected that its completion will take about three years. It is reported that the speed of the ship will be about 25 knots. An eventual Cunard liner might exceed this. In the meantime, the French Compagnie Générale Transatlantique is ordering a 50,000-ton ship designed for a speed of 30 knots.

Attention is being drawn in the shipbuilding world to the present-day tendency toward the building of motorships up to a tonnage of 20,000. One leading Clyde shipbuilder has stated that, in his opinion, the ratio of motorships to steamers is reaching its highest point, and that ten years hence the proportion of steam-driven vessels will be larger than it is at present. He pointed out the improvements that are being made in steam engine construction, especially the development of high-pressure turbines and the more economical utilization of coal. The fact that the new White Star liner will most probably be steam-driven, although Lord Kylsant, chairman of the board, is a firm believer in diesel engine propulsion, shows that beyond a certain tonnage the use of internal combustion engines still is today considered as a venturesome step.

The Clyde launchings in September were 13 vessels totaling 69,620 tons. In August, 22 vessels totaling 73,525 tons were launched constituting the most satisfactory monthly returns for this year and for any August since 1920. In the first nine months of the year, 160 vessels of 485,823 tons were launched. A large variety of work is being done on the Clyde, although a great part of the machinery for the ships is built in other districts, and in some cases, on the continent. New contracts are scarce and the employment outlook for the winter is poor. Some of the recent launchings are of particular interest, owing to certain new features of the vessels concerned. The BRUNSWICK, a diesel-electric oil tanker of 13,000 tons deadweight and 2800 shaft horsepower,

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was built by Scott's Shipbuilding and Engineering Co., Ltd., Greenock, for the Atlantic Oil Shipping Co. of Philadelphia. She attained 11½ knots on trials at full load. The vessel is claimed to be the largest electrically-driven merchant ship afloat and is the first of the type built on the Clyde. The propelling machinery consists of four generating sets of Ingersoll-Rand six-cylinder motors built by Carels Frères, of Ghent, Belgium, and the electrical transmission gear was supplied by the British Thomson-Houston company.

First All British Diesel

The VICEROY OF INDIA, illustrated at the head of this article, launched on Sept. 15 from the yards of Alexander Stephen and Sons, Ltd., Linthouse, is the first turbo-electric liner built in Great Britain. The vessel is of 19,000 tons gross, and the machinery consists of two turbines, each of 8500 shaft horsepower, coupled direct to generators. The machinery was supplied by the British Thomson-Houston Co., and the electric motors will develop 18,000-horsepower, which will give the ship a speed of about 19 knots. The boilers, of the Yarrow watertube type, will be oil-fired and have a working pressure of 400 pounds per square inch. Another interesting ship is the one ordered by the Berwindmoor Steamship Co. from the Blythswood Shipbuilding Co., of Glasgow. It is an 8000-ton coal and ore carrier, steam-driven, but using pulverized fuel. The use of pulverized on board ship recently was demonstrated, by the Blue Star Line, Ltd., one of their recent ships, the STUART-STAR, having been fitted with pulverized coal equipment. The results of the round voyage London to Buenos Ayres and back have been considered sufficiently satisfactory to justify expansion of the system.

The Blythswood Shipbuilding Co. also have on hand a motor tanker of about 3000 tons which they are building for Iranian Tankers, Ltd, London, and which will be the first vessel fitted with the new type of double-acting internal combustion engines and manufactured by Richardsons, Wesgarth & Co., of Hartlepool. It is claimed to be the first diesel engine of wholly British design and manufacture. Tests effected on the two-year old Anchor liner BRITANNIA with the Bauer-Wach exhaust turbine showed that this exhaust turbine connected with the existing reciprocating engine gave an increase of efficiency of 18 per cent.

Tyneside shipyards have been obtaining an increasing amount of foreign work. Demand generally is improving and several tenders outstanding are expected to materialize in definite orders. In the first seven months of the year, 38 vessels of 195,837 gross tons were launched, as against 26 vessels of 105,349 tons in the corresponding period of last year. The Northumberland Shipbuilding Co. has contracted for two cargo vessels of 9000 tons, one being a motorship with Doxford engines. Swan, Hunter and Wigham Richardson recently launched the SEA TRAIN for Overseas Railway Co., New York. The boat is designed to carry 92 loaded freight cars between Havana and New Orleans. The same builders have received a contract for ten 2000-ton steamers for the Canadian lakes. Part of the work will be done at the firm's yards on the Wear and on the Clyde. At the end of July, Swan, Hunter's launched the PORT FAIRY, of 11,000 tons, with Doxford opposed piston type engines, specially built for food carrying. An order was also received for two fast passenger steamers for the Gothenburg-London service from the Swedish Lloyd Steamship Co. The propelling machinery will consist of single-screw turbines, and delivery is to be effected in May next year.

Gray & Co., Ltd., of Hartlepool, has received several orders. Two cargo steamers of 9100 tons deadweight were ordered by Sir Robert Ropner & Co. Three vessels of 280 feet in length were ordered from the firm by Spanish owners, while another steamer of 8500 tons deadweight also was ordered by a continental owner. Two 8000-ton cargo steamers were awarded to Bartram & Sons, Ltd., of Sunderland, by Cardiff owners. A number of orders have been received at the Tyne shipyards of Armstrong, Whitworth & Co., Ltd., including three twin-screw motorships of 8500 tons for Westfal Larsen & Co., of Bergen, Norway, a diesel engine oil tanker of 10,300 tons for a London owner, and another tanker of 11,000 tons for the Aktiebolaget Olson and Wright, of Stockholm, Sweden. These two orders will bring the total tanker tonnage built by Armstrong-Whitworth to nearly 1,000,000 tons deadweight.

Output at the Belfast shipyards has been increasing. Workman, Clark (1928), Ltd., has secured an order for an oil tanker, which, it is claimed, will be the largest afloat when completed. It will be over 600 feet long and about 18,000 tons gross. Harland & Wolff at present have about 250,000 tons of motor-driven passenger vessels under construction at Belfast. Early in July the last of the nine motorships ordered by the King Line, Ltd. was launched. This vessel, the KING WILLIAM, is similar to the previously launched sister ships, which already have been described. At the end of August, Harland & Wolff had on its books the 60,000-ton White Star liner and another motor passenger vessel of 26,000 tons for the same owners, two 20,000-ton motor passenger ships for the Union Castle Mail Steamship Co., Ltd., four passenger and cargo motorships of about 15,000 tons gross for the Nelson line, a passenger motorship for the African Steamship Co., and three cross-channel motorships for the Belfast Steamship Co., Ltd.

Freight Rates Are Firmer

Freight rates have slightly hardened during the summer months. The accompanying chart of index number, compiled from *The Statist*, London, shows that August rates were on the whole slightly higher than in January, thus constituting a record

(*Continued on Page* 82)

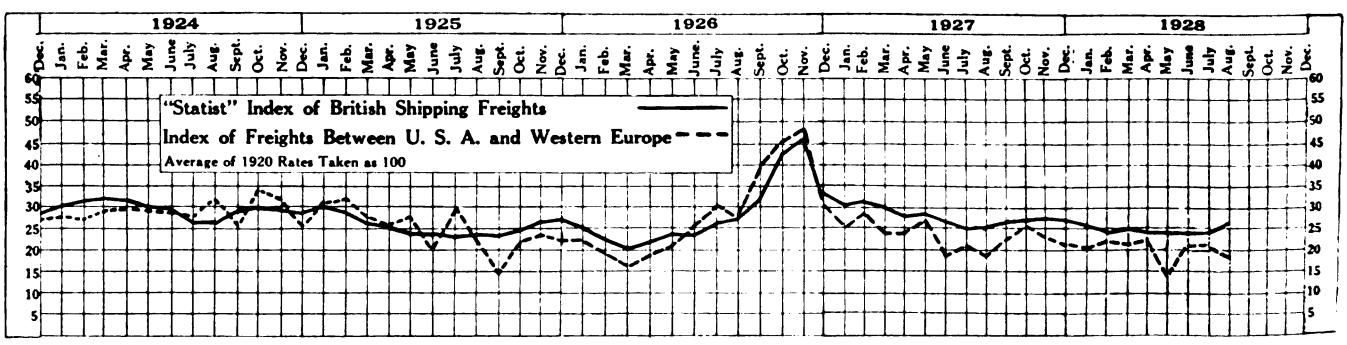

Diagram Showing Fluctuation of Ocean Freight Rates for Four Years and Eight Months

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Mail Awards Specify New Ships

Twenty Mail Contracts Already Awarded—Total Nearly $12,000,000 Annually—Thirty-three New Ships Will Be Required in Due Course

IN ORDER to give clear and accurate information with reference to mail contracts under the merchant marine act of 1928, the Washington correspondent for MARINE REVIEW called at the postoffice department to obtain this information first hand. It is given below as supplied by that department. From this it will be seen that the government is now obligated, under terms of the mail contracts already awarded, to the annual expenditure of $11,631,219.

On the other hand definite provisions in these contracts call for the building of a considerable number of new vessels, with a total minimum of 33, the greater proportion of them within 5 years. From this it can be said that the merchant marine act of 1928 has already begun to function effectively along the lines intended, that is to aid in building up an American merchant marine. At least it has begun to be effective in bringing about many inquiries for tonnage and much activity on the part of shipyards in submitting proposals. On this basis we look for a revival in shipbuilding in the near future, unequaled at any previous time in our history, with of course, the exception of the war period. If American capital turns to the sea it will mean ships and equipment of the most modern type and there are indications of a tendency in this direction. And why not with the Atlantic and Pacific bounding our shores.

Ocean Mail Contracts Awarded Under Merchant Marine Act of 1928, to American Steamship Companies Up to Oct. 12, 1928

Route Number	Steamship Co. & Termini	Class of Vessels Required at Start of Service	Annual Rate of Payment at Contract Rate	Class of Vessels Required to be Substituted
4	**Munson Steamship Line** New York to Buenos Aires	Class 3—18 knots—12,000 tons	$1,328,076.00	None
5	**Export Steamship Corp.** New York to Mediterranean and Black Sea Ports	Class 6—10 knots—4,000 tons	1,063,140.00	Four vessels of Class 5—13 knots. One within 3 years from award of contract and one additional each successive year until 4 have been placed in operation.
6	**American South African Line** New York to Beira, Portuguese E. Africa	Class 6—10 knots—5,000 tons	248,280.00	One new vessel of Class 5—13 knots—6,000 tons within two years from award of contract and one additional of same class after fifth year.
8	**Grace Steamship Company** New York to Valparaiso	One of Class 4—16 knots Others of Class 5—13 knots	592,200.00	One additional new vessel of Class 4 within one year from award of contract and one additional new vessel of Class 4 within three years after award of contract.
10	**New York & Porto Rico SS Co.** San Juan to Santo Domingo City	Class 5—13 knots—8,000 tons	46,176.00	None
15	**Eastern Steamship Lines** Boston to Yarmouth	Class 3—19 knots—5,000 tons	221,832.00	None
16	**American Scantic Line** New York to Copenhagen	Class 6—10 knots—4,000 tons	469,320.00	Eight vessels of Class 6, 12 knots—4,800 tons, two within 15 months from award of contract; one additional within the succeeding 15 months and one additional each 18 months thereafter.
17	**American West African Line** New York to West African Ports	Class 6—10 knots—4,500 tons	325,287.50	Three vessels of Class 5—14 knots—4,000 tons. One within the fourth year from the award of contract and two during remainder of the contract.
18	**Atlantic & Caribbean Steam Navigation Co.** New York to Maracaibo	Two of Class 5—13 knots Others of Class 6—10 knots	400,002.00	After completion of the third year of the contract, one additional vessel of Class 5—13 knots—3,000 tons.
20	**New York & Cuba Mail SS Co.** New York to Havana	Class 4—16 knots—6,000 tons	370,032.00	Two new vessels of Class 3—18 knots—10,000 tons within 3 years from the award of contract.
21	**New York & Cuba Mail SS Co.** New York to Progreso	Class 5—14 knots—4,500 tons	419,536.00	One vessel of Class 5—15 knots—6,000 tons within three years from the award of the contract.
23	**Lykes Bros. Steamship Co.** Galveston to Santo Domingo City	Class 6—10 knots	242,190.00	One vessel of Class 5—13 knots—4,000 tons within 4 years from award of contract.
24	**The Oceanic Steamship Co.** San Francisco to Sydney	Class 4—16 knots—4,000 tons	687,888.00	Two new vessels of Class 3—18 knots—10,000 tons. One within three years from award of contract and another within four years from the award of contract.
25	**Dollar Steamship Line** San Francisco to Manila	Class 3—18 knots—12,000 tons	1,683,552.00	None
26	**Admiral Oriental Line** Seattle to Manila	Class 3—18 knots—12,000 tons	1,427,712.00	None
27	**Dollar Steamship Line** San Francisco to Colombo	Class 5—14 knots—10,000 tons	1,141,296.00	New vessels of Class 3—18 knots—12,000 tons. One within three years from award of contract and one each successive two years thereafter.
28	**States Steamship Company** Portland to Manila	Class 6—10 knots—4,000 tons	399,540.00	Two vessels of Class 5—14 knots—4,000 tons. One during the 4th year of the contract and one during remainder of contract.
29	**States Steamship Company** Portland to Dairen, China	Class 6—10 knots—4,000 tons	184,440.00	One vessel of Class 5—14 knots—4,000 tons.
30	**Oceanic & Oriental Nav. Co.** Los Angeles to Auckland	Class 6—10 knots—4,000 tons	169,740.00	None
31	**Oceanic & Oriental Nav. Co.** Los Angeles to Melbourne	Class 6—10 knots—4,000 tons	210,960.00	None

Note: The aggregate annual sum in mail contracts up to Oct. 12, 1928 as per the above table is $11,631,219.

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A Great Waterway Nearly Ready

Ohio River Project Nears Completion—Almost 1000 Miles from Pittsburgh to Cairo, Ill. With 9-Foot Stage of Water

By W. G. Gude

WELCOMING the announcement that 1929 will witness the completion of work on the last of the locks and dams on the Ohio river permitting year-round transportation from Pittsburgh to the Gulf of Mexico, delegates to the thirty-fourth annual convention of the Ohio Valley Improvement association held at Pittsburgh Oct. 3 and 4 turned their attention to plans for celebrating this event and discussion of means for obtaining the greatest use from the increased river facilities. While the 1927 convention advocated the construction of terminals, resolutions of the 1928 session stressed this point more emphatically and also offered the services of the association to provide speakers and helpful agencies for each city in the valley, to educate their citizens to the possibilities of river transportation.

The convention strongly recommended further improvements and standardization of existing works on the great trunk line project and the principal tributaries. It also urged that the proposed locations of all future bridges across navigable rivers be considered carefully and that all bridges have sufficient heights and widths of span to provide free, easy and unobstructed navigation under or through them. The association went on record asking that the necessities and protection of navigation be the first consideration in any power development program that may be considered by impounding the waters at the source of the streams.

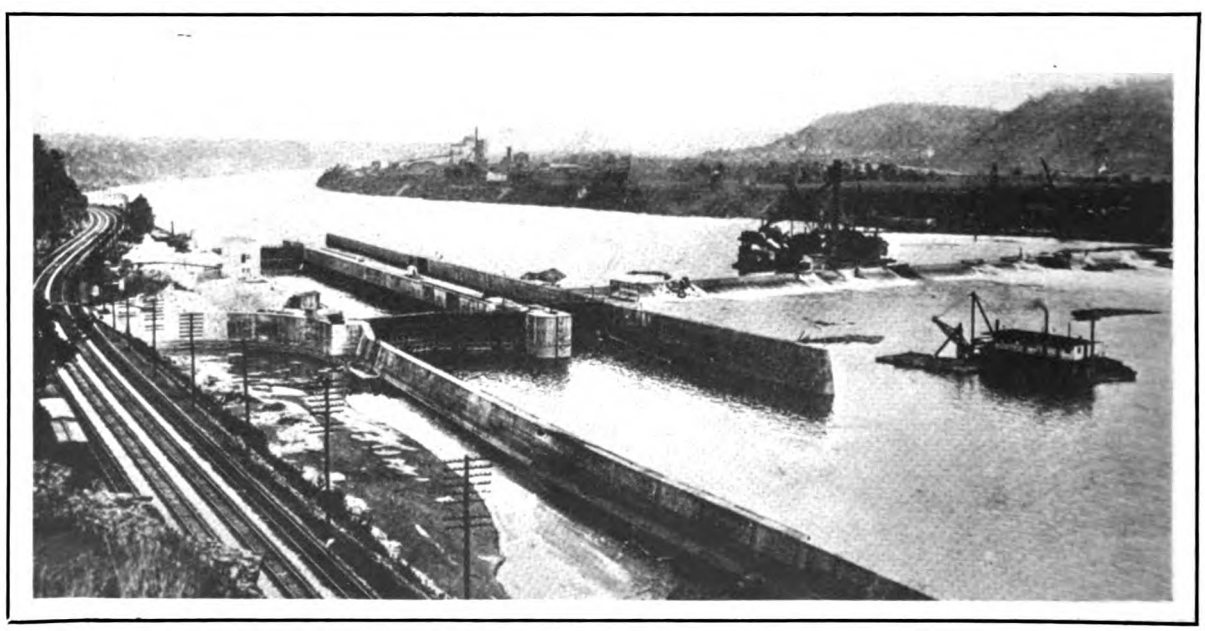
Final Work Now Under Way

The program of the recent convention consisted of business sessions in the morning and afternoon of Wednesday, Oct. 3. At noon, delegates were guests of the Jones & Laughlin Steel Corp. at a luncheon at the Chartiers Heights Country club. The annual banquet was held that evening. The final business session was held Thursday morning and in the afternoon an inspection trip was made over the Ohio, Allegheny and Monongahela rivers, with the Carnegie Steel Co. as host.

Delegates were told by Col. George R. Spalding, corps of engineers, United States army, who has charge of the Louisville district and who is directing work on the four remaining locks and dams in the series, that two are expected to be completed within the next 30 days and that the remaining two will be ready for service in less than a year. Work now is in progress on the Ohio river at Deadman's island, 13 miles below Pittsburgh, on a fixed dam to replace dams 3 and 4. Installation of the locks and gates is expected to be completed next spring. With its completion the Ohio will have a 9-foot stage of water from Pittsburgh to Cairo, Ill.

"The completed Ohio river will have cost about $115,000 per mile," said Col. Harley B. Ferguson, Cincinnati, in charge of the central division. He said that the total cost of improving the Ohio and its tributaries has been about $150,000,000, while the annual cost of maintenance and operation will be about $4,000,000, while that of the Ohio river alone is placed at about $2,500,000.

Now that canalization of the Ohio is about finished, development of its tributaries is next in order, Colonel Ferguson continued. It is practical on some of the tributaries, notably the Kanawha and Green rivers, he declared, to build dams 30 feet high and thereby develop, as a by-product of navigation, water power. This



Emsworth Dam, 6.1 miles below Pittsburgh on Ohio River, Completed in 1921. Photo shows Dam under Construction

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power, sold to industrial concerns, will help to pay for the maintenance of the rivers, he said.

Rapid Increase in Traffic

The rapid increase that has taken place in traffic over the Ohio river was pointed out by Capt. Oscar F. Barrett, president of the association, at the opening session of the convention. He stated that while the tonnage for 1927 showed an increase of 143 per cent over the 1923 total, the average length of haul had decreased during the five-year period from 86.5 miles to 60.5 miles, the ton-mileage showing an increase of 71 per cent. "The decrease in average haul mileage," he said, "is probably caused by increasing use of the river around the Pittsburgh district for intermill shipments." Nevertheless, the average haul of iron and steel products last year was 300 miles.

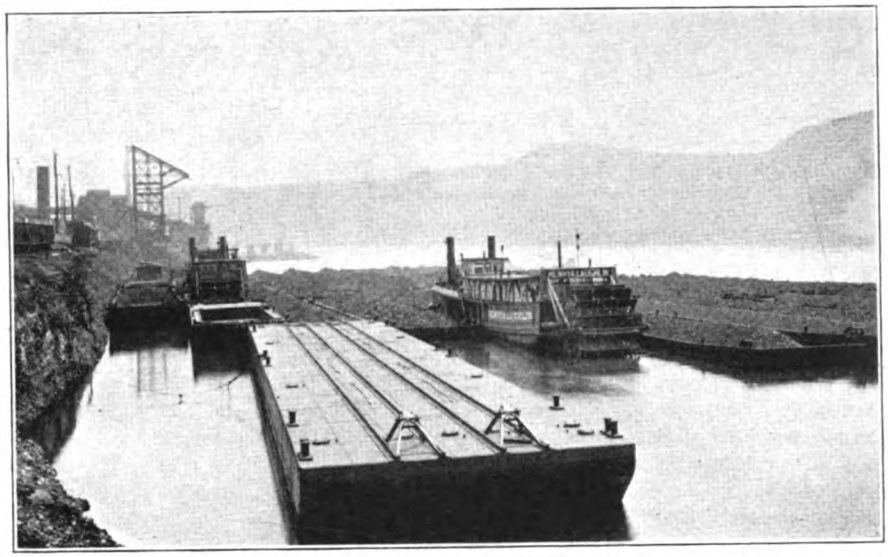
"The facts," continued Mr. Barrett, "unmistakably indicate that we do not yet have a river capable of handling regular trade in cargoes from one section of the country to the other. While it serves a local need, it is not carrying regularly the products of the Ohio valley to tidewater or to distant markets. Local traffic is very desirable and doubtless will increase substantially, but it was not for this traffic that the people of the United States invested so heavily in the improvement of the river. In 1929 this improvement will have been completed and the people will expect returns from the investment."

President Barrett proposed in his annual report that a steamboat parade proceed from Pittsburgh to Cairo, where the Ohio empties into the Mississippi river.

River traffic has increased markedly in the Pittsburgh district during recent years due to the active interest of large industrials in this method of transportation. The Jones & Laughlin Steel Corp. instituted river delivery of steel to distant customers in the West, South and Southwest in 1921. This practice was successful from the start and has expanded today into a regularly organized private distribution service. The company recently gained the distinction of being the first large shipper to inaugurate a year-round service on the Ohio and Mississippi rivers.

Steel now is being shipped systematically from Pittsburgh in barges by the Carnegie Steel Co., acting for itself and the other subsidiaries of the United States Steel Corp., by the Wheeling Steel Corp., the Pittsburgh Steel Co., and other steel producers. In 1917, the Carnegie Steel Co. had one towboat and 21 steel barges. Today it has 14 towboats, 314 open top barges, and 18 cargo barges. River traffic on the Allegheny river has not matched that on the Monongahela but completion of a present program providing for the construction of eight locks and dams is expected to increase activity on this stream. Six locks and dams already are complete. Plans and specifications for the seventh are practically complete and work is under way on details for the eighth. This program will establish a slackwater depth of seven feet for 24 miles up the river from Pittsburgh, and by eight feet for an additional 37 miles.

Completion of the canalization of the Ohio river is expected to witness a further steady growth in the increase that already has taken place in river shipping, with accompanying activity in river terminal construction and floating equipment buying. Barge builders in the Pittsburgh district have been busy in recent months, 152 steel barges having been placed from August to October, and officials are sanguine regarding the outlook for the next two years.



Carferry and coal barges at Coal Tipple, Jones & Laughlin Steel Corporation, Pittsburgh

At the final session of the association, officers were re-elected for the ensuing year as follows: President, Capt. Oscar F. Barrett; secretary, W. C. Culkins; treasurer, George Puchta. About 150 vice presidents were elected—Ohio, West Virginia, Pennsylvania, Kentucky, Indiana and Illinois all given representation.

The shipping board at its meeting Oct. 16 authorized the Merchant Fleet Corp. to advertise for bids on the steel cargo vessel KOSCIUSZKO. The vessel is described as of 7371 deadweight tons, with three scotch boilers, one triple expansion engine, and is now located at Staten Island, N. Y.

How River Traffic Has Increased

Allegheny (Natrona to Pittsburgh, 24 Miles)

	1917	1924	1925	1926	1927
Coal	956,697	841,923	915,225	1,228,913	1,021,714
Coke	.....	59,150	92,268	26,292	229,763
Sand and gravel	1,201,515	3,357,365	3,669,244	2,320,278	2,249,162
Iron and steel	126,031	55,087	16,499	10,927	9,801
Other	15,900	25,986	51,607	175,529	350,507
Total	**2,300,143**	**4,339,511**	**4,744,843**	**3,761,739**	**3,860,947**

Monongahela (Fairmont, W. Va., to Pittsburgh, 127 Miles)

Coal	12,300,097	17,749,150	18,697,832	21,003,349	20,811,870
Coke	294,195	737,702	892,851	746,972	885,774
Sand and gravel	3,158,129	2,600,699	3,257,751	2,594,320	2,028,930
Iron and steel	159,683	371,675	548,840	571,284	957,278
Other	97,029	419,589	318,847	1,458,757	810,777
Total	**16,009,133**	**21,878,815**	**23,716,121**	**26,374,682**	**25,873,029**

Ohio (Pittsburgh to Cairo, Ill., 981 Miles)

Coal	2,840,550	5,627,217	6,527,862	8,355,478	8,121,217
Coke	6,013	183,810	397,217	358,229	396,497
Sand and gravel	1,202,374	3,746,883	6,854,475	8,997,515	9,187,007
Iron and steel	1,756	558,720	534,817	575,462	1,039,821
Other	548,182	750,052	1,422,644	1,468,294	1,373,976
Total	**4,598,875**	**10,866,682**	**15,737,015**	**19,754,978**	**20,128,518**

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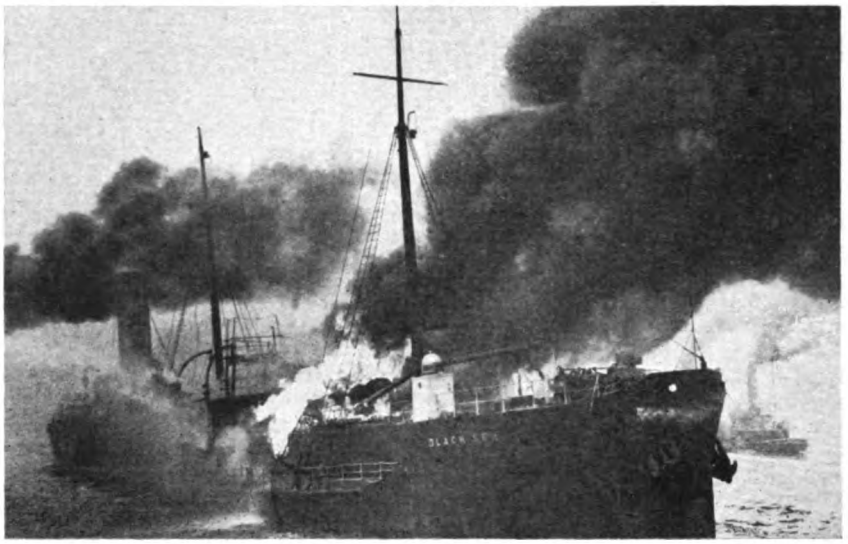
Fire Menace on Shipboard is Now Subject to Effective Control

OF THE many perils that menace those who go down to the sea in ships, there is none so terrifying as fire raging uncontrolled in a ship in mid-ocean. Isolated for a day or even days from outside help and in case of fire there is no avenue of escape, except life boats. If disaster is to be averted, the fire must be put out and put out quickly. No matter how small a fire on board ship may appear it should be considered as an incipient conflagration.



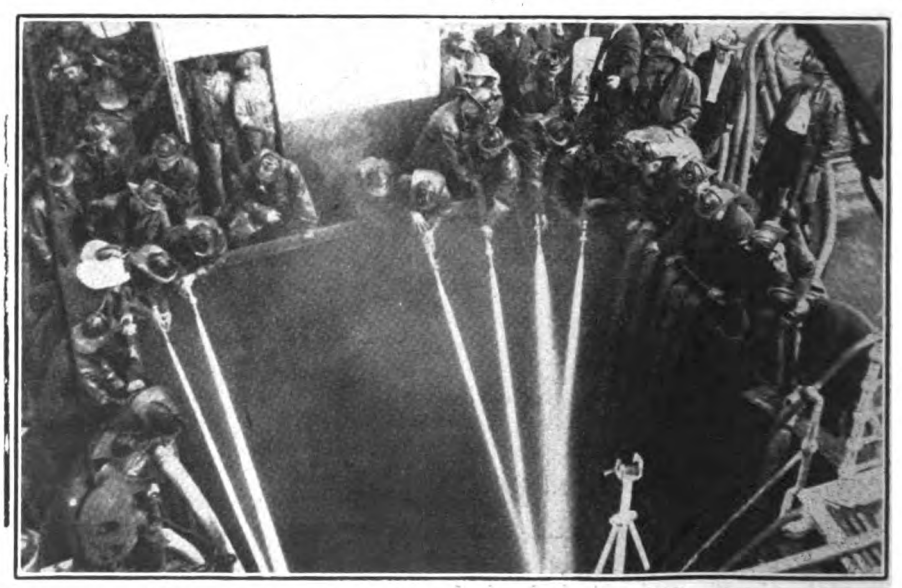
British Oil Tanker Black Sea on Fire off Bayonne, N.J.

Authorities tell us that the greatest menace from fire is, without doubt, located in the cargo holds. Chief Kenlon of New York city says that cargo holds are "warehouses built without windows or doors, with a skylight on the roof as the only means of access, and filled with every sort of combustible material imaginable—hogsheads of rosin, bales of cotton, crated furniture, barrels of pitch, stacks of dry goods and such inconsiderable 'trifles' as a few boxes of celluloid toys and novelties. Can the mind of man conceive a collection of heterogeneous merchandise more calculated to provide the wherewithal for a conflagration?"

The problem of cargo hold protection has always been a difficult one. Water, of course, is a very commonly used medium for extinguishing fire but on board ship the use of water has very definite limitations. In order for water to be effective it must be delivered to the seat of the fire. When once a cargo hold is stowed with its miscellaneous freight, it is impossible (in case of fire) to reach all portions with hose streams. Also, flooding of the hold may seriously endanger the stability of the ship and the possibility of water damage to the cargo may be almost as serious as that involved in the fire itself.

Steam is also used for extinguishing fire in cargo holds. It operates by replacing the oxygen of the air, which is necessary for combustion, and thereby smothers the flames. Steam, however, also has the disadvantage that it is damaging to the cargo and often loses some of its effectiveness due to condensation.

The third method of extinguishing fires in cargo holds, and probably the most effective, is by the use of an inert gas such as carbon dioxide. As we all know, fire needs oxygen and, therefore any inert gas can be used to put out fire by depriving the fire of oxygen. When carbon dioxide dilutes the oxygen content of the air, 17 per cent or more, the resulting mixture will not support combustion and the flames are extinguished. Right here it should be pointed out that carbon dioxide does not "freeze out" a fire or appreciably reduce the temperature of the burning material. Although carbon dioxide, as it is discharged from an extinguishing device or system, has a temperature of about minus 110 degrees Fahr., it does not follow that the fire is frozen out. Careful consideration will prove that the temperature of an extinguishing medium is not an important factor in fire control. For example, let us suppose we had a pile of burning rubbish and were given a choice of using cracked ice or an equivalent amount of boiling hot water. Most surely we would choose the boiling hot water even though its temperature was 168 degrees higher than that of the ice. We repeat—that the fire extinguishing ability of any substance



S.S. Anconcagua on Fire after Explosion at Pier 29 Brooklyn, N.Y.

This article was especially prepared for MARINE REVIEW, at the request of the editor, by a member of the staff of American-La France & Foamite Corp.

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is not its temperature but rather its ability to *absorb heat* or its ability to *exclude oxygen*. The low temperature of discharging carbon dioxide is an extremely small factor in fire control. The exclusion of oxygen is the property which makes carbon dioxide a real fire extinguishing medium.

Carbon Dioxide Effect Known

The use of carbon dioxide as a fire extinguishing agent was first suggested about fifty years ago. Lieut. F. M. Barber, of the United States navy, in 1875 described the then newly developed means of liquefying carbon dioxide commercially and storing it in steel pressure cylinders, and suggested that bottles of carbon dioxide be kept on the deck of a vessel so that they could be emptied in the holds in order to extinguish fires.

The application of liquefied carbon dioxide to the extinction of fires developed slowly for the reason that the gas could not be released quickly and completely. When the valve on an ordinary commercial pressure cylinder is opened, the pressure is reduced, the liquid changes into a gas, and the gas expands as it passes through the valve. When a gas expands it absorbs heat, and hence the carbon dioxide absorbing heat from the air quickly chilled and solidified and clogged the orifice. This drawback has been overcome by proper design and rapid uninterrupted discharge, without clogging, has been made possible and piped systems of carbon dioxide are available for the protection of ships at sea. The experience with this type of protection against fire has been very favorable and at the present time hundreds of cargo and passenger vessels, oil tankers, and yachts are so protected.

In one make of system, known as the Alfite system, the gas is stored in steel bottles or cylinders as a liquid under pressure. Each bottle is fitted with a specially designed valve which at once seals positively against leakage, yet makes possible a complete and rapid gas discharge at the time of fire. This valve is positive in action, reliable and simple. Its materials are noncorrosible in sea atmosphere.

A typical installation has the cylinders grouped in batteries, capable of simultaneous discharge. These batteries of cylinders are connected together with a manifold of correct design and proportions to withstand the high gas pressures at the time of release. This in turn is connected to a distribution manifold with valves leading to piping and gas outlets going into every hold. Thus any battery of cylinders can be discharged into any hold. In the holds the piping is run where convenient but so spaced as to insure the maximum amount of gas distribution in the minimum time.

The cylinders are located in a space out of the probable fire zone and yet accessible for periodic inspection. Because of their relatively small size no great space is needed.

When fire is discovered in a hold the valves in the discharge manifold covering all holds are adjusted to direct carbon dioxide gas to the threatened hold only—the manual release is pulled—and the fire goes out.

There can be no question about the effectiveness of this operation. Alfite carbon dioxide gas is flooded into the burning hold—and where there is this gas there can be no fire. It is a matter of seconds only before the fire is out. The gas spreads throughout the hold, reaching the smallest cracks, the farthest corners, working its way into the very center of porous materials or heaps of cargo, smothering flames, putting out every sign of fire.

Briefly, the advantages which recommend carbon dioxide fire extinguishment to the attention of shipowners and ship operators are as follows:

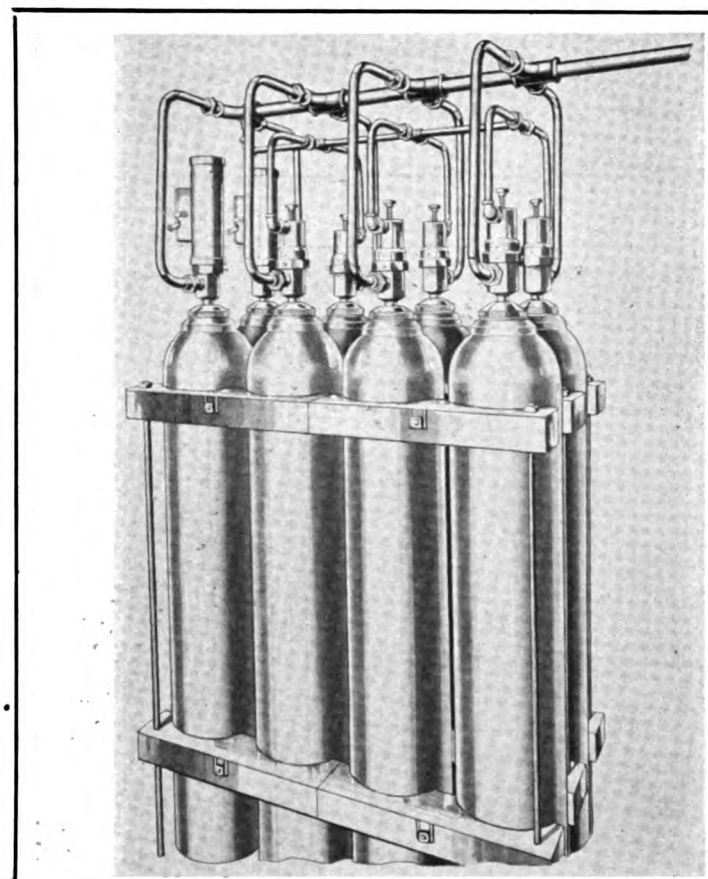
1. Carbon dioxide works in three dimensions. It goes into every recess, crack, and opening. It permeates inaccessible places and is effective around corners. It penetrates confined spaces.

2. Carbon dioxide is neutral toward almost all kinds of cargo, and will not damage the finest silks or the most delicate merchandise. It is even used commercially as a preservative for foods.

3. Carbon dioxide leaves no residue. There is nothing to clean up after a fire.

4. Carbon dioxide acts quickly. It is so rapid in extinguishing action that fire controlled by carbon dioxide systems are small fires. They have no time in which to spread.

5. Carbon dioxide is colorless, odorless, tasteless and nonpoisonous. Because of the similarity between the chemical formulas of carbon monoxide (CO) and carbon dioxide (CO_2) some people have a misapprehension as to the properties of carbon dioxide from the standpoint of safety to life. Carbon monoxide is one of the poison-



Dry Carbon Dioxide Gas under Pressure in Steel Cylinders. Each Group discharges simultaneously into any desired space

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ous constituents of exhaust gases from automobiles and should, of course, be feared. But, this has no relation to the properties of carbon dioxide which is harmless to life except as it may reduce the oxygen content of the air below that necessary for breathing. Fire, itself, generates irrespirable gases in large quantity and the effect of carbon dioxide on the atmosphere is negligible as compared with these gases. Of course, a cargo hold filled with carbon dioxide in sufficient amount to extinguish fire is not a good place to go into and, on the other hand, neither is the same hold a good place to enter when afire.

6. Carbon dioxide, because of its high specific gravity, seeks the bottom of cargo spaces and can, therefore, be confined with small loss in cargo holds.

7. Carbon dioxide can be used on motor ships where steam is not available.

8. The supply of carbon dioxide is independent of boilers and all other mechanical equipment on the boat and is available at any time on simply opening the valves of the cylinders.

The Alfite system of carbon dioxide protection described in the above is a unit of American-LaFrance and Foamite protection developed by this company after considerable research.

Diesel Power to Replace Hand Labor

By Edward B. Pollister

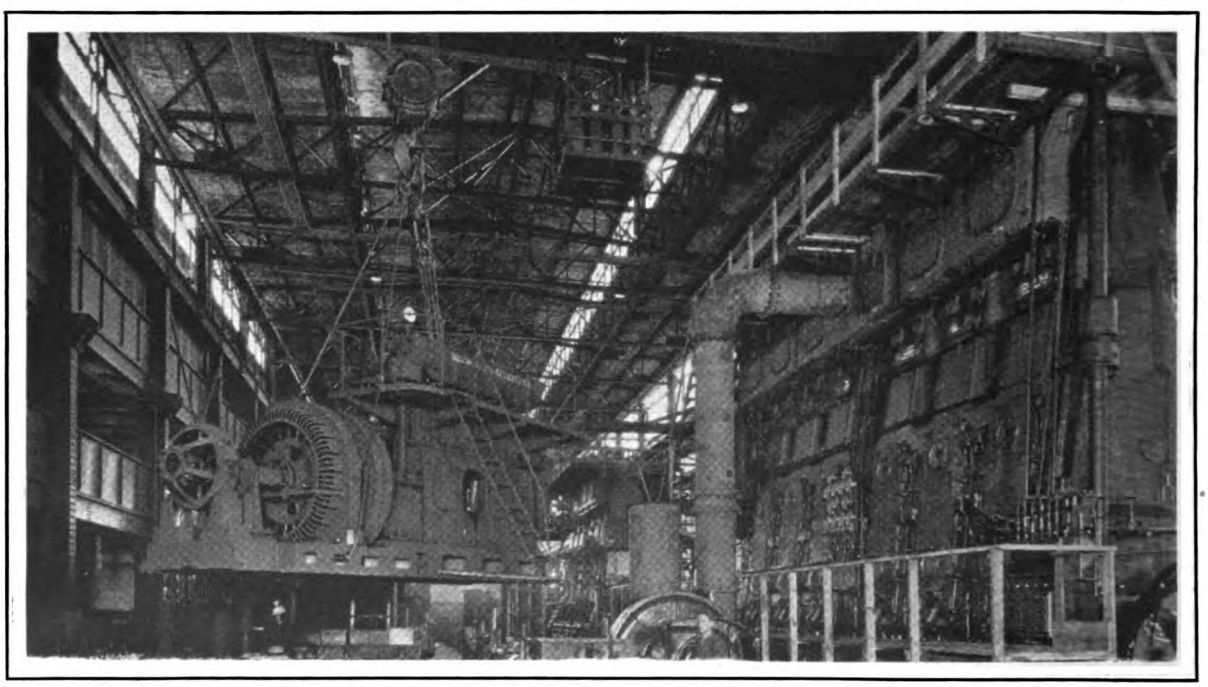
A MODERN diesel generating set of 225 horsepower with a three phase, 60 cycle, 480 volts alternating current, General Electric generator and direct-connected exciter all mounted on a common sub-base was recently completed in the shops of the Busch-Sulzer company. This generating set was ordered from the appropriation for flood control of the Mississippi by the Mississippi River commission for the fourth district at New Orleans. It is to be installed on a new concrete mattress casting barge for river revetment work. This marks an economic event in putting the efficient diesel engine to work on the national flood control problem.

During past floods bands of negroes wielding hand tools, filling sacks with earth for revetment purposes, everywhere gave evidence of the lack of modern methods and up-to-date machinery in trying to keep the Mississippi river in its bed during high water periods. In place of these old time earth works the use of concrete, prepared on barges at the point where reinforcement of river bank is needed, made in sections and tied together by steel cables gives effective and permanent results.

The building of the barge was rushed with all speed and the diesel electric generating unit was purchased under contract providing penalty for delay in delivery. Delivery was promised within fifty days including the electrical test of the complete unit at the plant of the builder; and shipment was actually made forty-three days after the award of contract.

An interesting view of this unit is given in the accompanying illustration showing the testing bay of the shops of the Busch-Sulzer Bros. Diesel Engine Co. The completed generating unit suspended from the crane is being transported from the test bed to a railroad car at the end of the shop. To the right of the small unit may be seen in fore and background the two 3950 brake horsepower, reversing marine engines ordered by the United

The author, Edward B. Pollister, is general manager of Busch-Sulzer Bros. Diesel Engine Co.



Diesel Electric Generator of 225 horsepower being moved from test bed to railroad car in Busch-Sulzer Shops. To right—Marine diesel engines of 3950 horsepower each. Two recently completed for the Shipping Board

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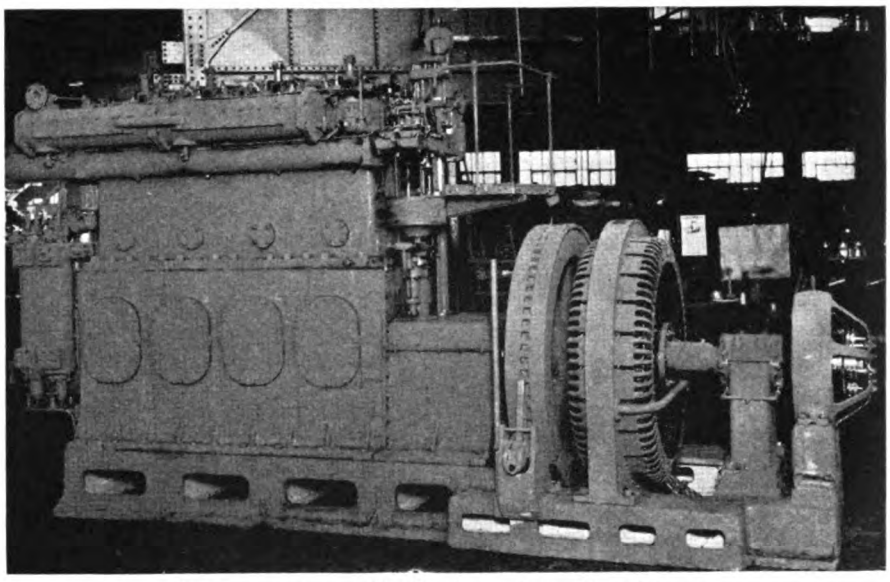
States shipping board. These engines are of two stroke cycle, single acting with six working cylinders. The bore is 30 inches and the stroke 52 inches. The air compressor is attached and there is a separate motor driven turboblower for supplying the scavenging air. These turboblowers are supplied by the Elliott Co. and one of them is shown in the foreground.

A shop test of the first of these large shipping board marine engines commenced on Oct. 1. Fuel consumption of this unit after allowing for power required to drive the turboblower is about 0.40 pound, and running as low as 0.394 pound. For cargo ships with sea auxiliary requirements in the neighborhood of 100 horsepower this would correspond to a total fuel consumption per shaft horsepower per hour for all purposes of around 0.43 pound.



Close up rear view of 225 H.P. Busch-Sulzer Diesel Generator

One of the accompanying illustrations shows a rear view of the 225 horsepower generating units. The unit is compact and clear cut in appearance with a minimum of piping and gear. For this heavy duty marine service a substantial thrust bearing is fitted between the engine and flywheel. The bedplate and crankcase are cast as an integral housing and the holding down flanges are located at the lowest point on the engine in order to facilitate mounting on a sub-base. The cylinders are cast en bloc to provide overall rigidity. The air compressor, directly driven from the main crankshaft, is overhung from the crankcase and is fitted with coolers of the straight tube type designed to give ready access for inspection and cleaning. General lubrication is supplied by a positive displacement pump to all main bearings, crankpins, piston pins, vertical shaft thrust bearing, camshaft bearing, upper and lower helical gears and to the outboard bearing. The supply of oil is continuous and under pressure following the normal design of the builder.

The Busch-Sulzer shops present evidence of great activity in the building of both large and small diesel engines. Though not visible in the test bed view there is a third large engine of 3750 brake horsepower of stationary type in course of erection. This engine is being built to order for the Federal Light & Traction Co. for installation in the generating station of the Tucson Gas & Electric Co. at Tucson, Ariz.

Offer United States Lines for Sale

By Lynne M. Lamm

BIDS will be opened by the United States shipping board on Nov. 15 for the purchase of the United States and American merchant lines. This is the second attempt which the government has made to sell these lines, the first having been made in 1926. It is indicated that if no sales are made at this time that it will be two or three years before the lines will again be offered for sale.

It was originally intended by the board to open the bids on Oct. 1 but the time was extended to receive bids on the reconditioning of the MT. VERNON and MONTICELLO. Advertisements inviting bids were published in the newspapers about the middle of August.

The vessels of the United States lines include, the LEVIATHAN, GEORGE WASHINGTON, AMERICA, REPUBLIC, PRESIDENT HARDING and PRESIDENT ROOSEVELT. Those of the American Merchant line include the AMERICAN MERCHANT, AMERICAN BANKER, AMERICAN SHIPPER, AMERICAN TRADER, and AMERICAN FARMER. There are also included in the proposals for sale the MONTICELLO and MT. VERNON, referred to above. These two latter ships are 19,000 tons each. The shipping board has received bids, noted on next page of this issue, for reconditioning these two ships. The idea in receiving these bids is that the government could transfer the contract for reconditioning to any successful purchaser if it so desired.

T. V. O'Connor, chairman of the board has stated that he is hopeful of receiving satisfactory bids for the vessels of the two lines but says that if the bids received are not satisfactory the operation of the lines will be continued without interruption as at present and that the question of making the MT. VERNON and the MONTICELLO suitable for service will be given consideration at that time.

The advertisements of the board do not include bids for chartering. They offer the alternative of bidding on a guaranteed operation period of five and ten years.

Ten alternative methods for bidding have been allowed as follows:

1. The sale of one combined line of present vessels.

2. The sale of one combined line of the present vessels plus the MT. VERNON and MONTICELLO.

3. One combined line of present vessels plus an agreement to construct two new ships suitable for fast mail service.

4. A combined line of the present vessels, substituting the MT. VERNON and MONTICELLO for the PRESIDENT HARDING and the PRESIDENT ROOSEVELT, with an agreement to recondition the MT. VERNON and MONTICELLO.

5. To purchase the combined lines minus the PRESIDENT HARDING and PRESIDENT ROOSEVELT and substitut-

The author, Lynne M. Lamm, is Washington correspondent for MARINE REVIEW.

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ing for them two new vessels to be constructed in American shipyards.

6. To purchase the present vessels of the United States line plus the MT. VERNON and MONTICELLO.

7. To purchase the present vessels of the United States line plus two new vessels.

8. The present vessels of the American Merchant line.

9. Operation of the American Merchant line between any north Atlantic port and the United Kingdom with the privilege of calling at the Irish or continental European channel ports.

10. Operation of the American Merchant line between any Pacific coast port and any European port.

It will be seen that the several plans offer practically every possible proposal of sale excepting the sale of the ships individually.

Should the proposal for the guaranteed operation over a period of ten years be selected, it is provided that the contract of sale will be modified accordingly and the amounts stipulated for liquidated damages and for the bond to be given shall be proportionally reduced after the first year the contract is in effect.

The guarantee of operations will be quire that the S. S. LEVIATHAN, flagship of the United States line fleet, shall make two round trip voyages between New York and a United Kingdom and French port each sixty days between March 1 and Dec. 31 of each year with a minimum of 13 round trip voyages each year. For the other vessels of this line, the GEORGE WASHINGTON, AMERICA, REPUBLIC, PRESIDENT HARDING and PRESIDENT ROOSEVELT, the requirement will be one round trip voyage between New York and a United Kingdom, a French and German port each sixty days during the period March - to Dec. 31 of each year with a minimum of ten round trip voyages a year over this route. The required guarantee for the vessels of the American Merchant line will be 45 round trip voyages between New York and London.

Payment of the purchase price of the lines will be on the basis of 2½ per cent accompanying the offers, 22½ per cent of the price of each vessel at the time of its delivery, and the balance in equal annual instalment over a period of 15 years.

Prices are Received for Reconditioning

Ex-German Liners Mt. Vernon and Monticello

AFTER a long period spent in the preparation of plans and specifications covering numerous widely differing schemes of reconditioning, bids were finally received on Oct. 9 for the rebuilding of the ex-German passenger ships, S. S. MOUNT VERNON and S. S. MONTICELLO now owned by the shipping board and for some years laid up. It will be recalled that in the last session, congress authorized the expenditure of $12,000,000, the sum estimated by the shipping board as necessary, for the rehabilitation of these two vessels. The board, therefore, has the authority without further reference to congress to carry out this work within the limits of the appropriation and possibly at a greater figure if it can find the money elsewhere.

The different schemes proposed for rebuilding the two vessels vary widely both in main features and in detail. They come, however, under two general heads; those offered by Gibbs Bros. Inc., and the Newport News Shipbuilding & Dry Dock Co. No less than 13 proposals and schemes were offered to the shipyards to bid on. Briefly defined they are; (a) proposal by Newport News Shipbuilding & Dry Dock Co., using geared turbines and scotch boilers; (b) proposal by Newport News Shipbuilding & Dry Dock Co., using turbo electric drive and scotch boilers; (c) proposal by Newport News Shipbuilding & Dry Dock Co., using geared turbines and watertube boilers; (d) proposal by Newport News Shipbuilding & Dry Dock Co., using turbo electric drive and watertube boilers; (e) proposal by Gibbs, using quadruple expansion, single reduction, geared turbines; two gears each shaft; watertube boilers; (f) proposal by Gibbs, using quadruple expansion, single reduction, geared turbines, one gear each shaft; watertube boilers; (g) proposal by Gibbs, using two sets, compound, double reduction, geared turbines each shaft; watertube boilers; (h) proposal by Gibbs, using turboelectric drive and watertube boilers; (i) proposal by Gibbs, using quadruple expansion, single reduction, geared turbines, two gears each shaft, and scotch boilers; (j) proposal by Gibbs, using quadruple expansion, single reduction, geared turbines, one gear each shaft, and scotch boilers; (k) proposal by Gibbs, using two sets, compound, double reduction, geared turbines each shaft, and scotch boilers; (1) proposal by Gibbs, using turboelectric drive and scotch boilers; (m) proposal by Gibbs, using direct drive diesel engines.

On these various proposals the bids received were:

Bethlehem Shipbuilding Corp. for the MONTICELLO, (a) $6.500,000; (b) $6.725,000; (c) $6,800,000; (d) $7,000,000.

Sun Shipbuilding & Dry Dock Co. for the MONTICELLO, (g) $7,507,500; (h) $7,822,000; (k) $7,734,000; (l) $7,595,000.

Morse Dry Dock & Repair Co. for the MOUNT VERNON, (g) $6,610,000; (h) $6,660,000; (k) $6,405,000; (l) $6,440,000.

Tietjen & Lang plant of the Todd Shipyards Corp. for (a) MT. VERNON, $6,640,000; MONTICELLO, $6,980,000; (b) MT. VERNON, $6,897,000; MONTICELLO, $7,100,000; (c) MT. VERNON, $7,383,000; MONTICELLO, $7,800,000; (d) MT. VERNON, $7,620,000; MONTICELLO, $7,925,000; (e) MT. VERNON, $8,880,000, MONTICELLO, $9,280,000; (f) MT. VERNON, $8,720,000, MONTICELLO, $9,130,000; (g) MT. VERNON, $8,830.000, MONTICELLO, $9,658,000; (h) MT. VERNON, $8,680,000, MONTICELLO, $9,094,000; (i) MT. VERNON, $8,900.000, MONTICELLO, $8,576,000; (j) MT. VERNON, $7,935,000, MONTICELLO, $8,427,000; (k) MT. VERNON, $8,150.000, MONTICELLO, $8,730,000; (l) MT. VERNON, $7,920,000, MONTICELLO, $8,385,000.

The Boston navy yard bid only on the MT. VERNON but put in bids on alternative as well as regular proposals as follows: (e) $7,160,465, alternative $6,827.455; (f) $7,134,523, alternative $6.801.523; (g) $7,039,113, alternative, $6,706,113; (h) $7,054.269, alternative, $6,721,269; (i) $6,860,455, alternative, $6,527,455; (j) $6,834,523, alternative, $6,501,523; (k) $6,739,113, alternative $6,406,113; (l) $6,754,269, alternative, $6,421,269.

The Newport News Shipbuilding & Dry Dock Co. submitted only one bid and it was the lowest received; for the MT. VERNON under proposal (a) $5,850,000.

It is necessary to bear in mind that

(Continued on Page 84)

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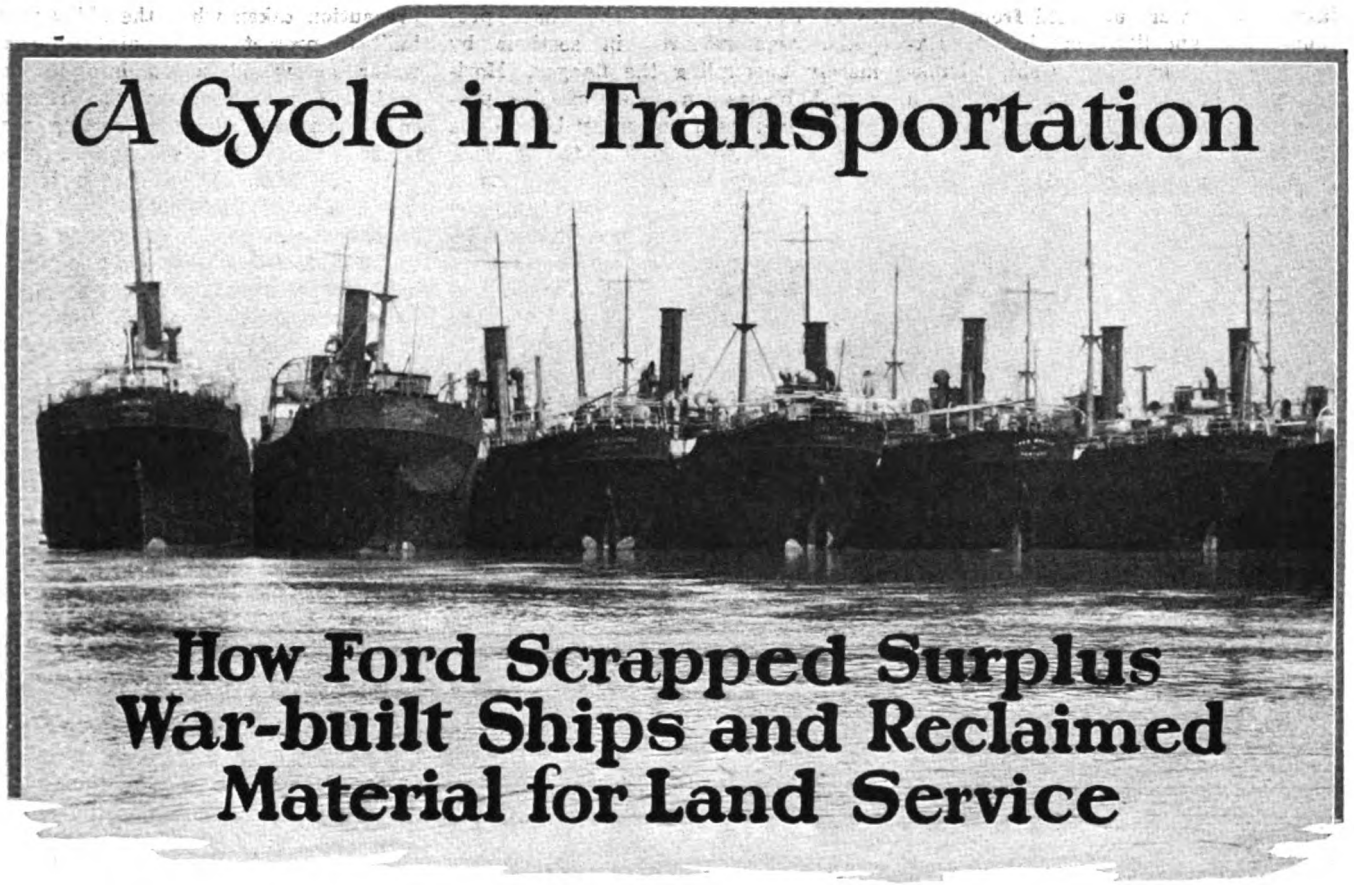
A Cycle in Transportation



How Ford Scrapped Surplus War-built Ships and Reclaimed Material for Land Service

Part IV—Ships Yield 216,532 Tons of Steel Scrap

DURING 1926 a progressive operation was followed at the main dismantling dock. There were ten positions, and as one ship was completely scrapped the others would be moved up a notch in line. This method was changed in 1927; each ship remaining at one place through all the work except the removal of the engine and boilers and the final cutting at the floating drydock. In 1926 the submarine scrap cargo in the lakers was removed largely through the hatches; in 1927 the top decks were first removed, furnishing easier access to the cargo.

The first step after a ship had been tied up at the main dock was the removal of such deck machinery and equipment as had not been taken off before. Then the ship was marked into squares for cutting. These squares followed a master diagram and provided for salvaging steel in as large sizes as possible.

The hulls of the vessels were all badly corroded. In some cases the rust was ⅝-inch thick. Oxygen gas torches obviously could not cut through metal already oxidized, so before the cutters could begin work pathways were cleared along the chalk marks by pneumatic chipping tools.

At intervals along the chalk marks a six-inch portion would be marked "Save." This would not be cut until the section was gripped by the crane slings; then it was completely severed and the section hoisted upon the dock. Thus workman were prevented from "sawing off the limb they were working on," and accidents avoided.

Removal of the superstructure and deck cabins came first in the cutting operation. The steel deck houses were burned close to the deck and taken off intact. Many of them were used in various parts of the Fordson plant as tool cribs, stockrooms, etc. With their watertight roofs, steel doors, and port-hole windows they were ideal for such uses; they were fireproof, warm and, because of the rigidity of their construction, could easily be transferred from place to place.

FOURTH instalment of the Ford Motor Co.'s own narrative of its scrapping of 199 surplus warbuilt ships from the shipping board. Previous instalments appeared in issues of August, September and October.

The smokestack was of excellent quality steel. It was cut off in one piece and sent to the fabricating shop where it was rolled flat into sheet metal. As such it was put to many uses. A few stacks were retained as stacks in new construction work. Some were dismantled, rolled into sheets and reshaped as hoods for carrying away steam and noxious gases at forges.

With the top of the vessel clear, cutting of the decks started. The schedule was so arranged that by this time all the men who had been working below loosening pipes, removing electrical fixtures, and unbolting machinery had left. Thus another potential accident risk was eliminated. The decks were cut off in large squares or rectangles. Once free, they revealed the entire interior.

Each vessel contained approximately 1000 tons of scrap steel in her hold. In most cases this had been so shaken by the sea journey that it had settled into a tangled mass difficult to handle. It was often necessary to tackle an individual piece from many angles before it could finally be dislodged. In some cases it was necessary to cut away portions of the scrap to lift it.

After the cargo had been unloaded the auxiliary machinery was removed. Condensers, pumps, dynamos, etc., were not cut free by the torches;

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instead they were unbolted from their foundations and lifted out intact. Excess coal contained in the ships' bunkers was unloaded, along with such other things as might be contained in the hold. Bulkheads were cut free at the ship's sides and lifted out, the smaller ones in one section, the larger in two.

In 1927 a vessel made only two moves once it was tied to the main dismantling dock: The first was to the "big hook" and the last to the floating drydock: Although the main engine weighed approximately 75 tons and the boilers more than 30 tons each it took only an hour and a half to remove them. The huge crane not only lifted them from the boats but also swung them in an 180-degree arc to the flat cars which conveyed them to the storage ground.

Many of the lakers carried engines and boilers from the submarine-type vessels as cargo.

With the power plant out, a vessel was moved back once more to its original position. It now resembled some huge, nightmarish canoe with its gaunt sides and empty interior. Torch and crane stripped the sideplates into ribbons. The bow, with its heavy supports and reinforcements, presented a difficult problem. These had to be cut through before removal.

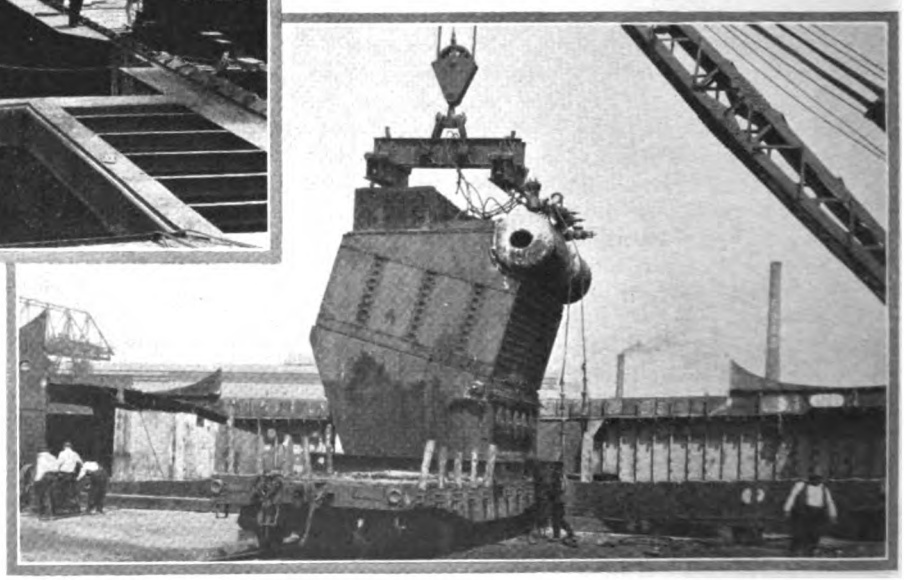
The shaft tunnel casing was cut away by torch, but the shaft propeller was removed in sections by merely uncoupling the flanges. Horizontal blades on most of the propellers had been cut away before the vessels started the trip to Fordson, so that they would not serve as a drag in the water. What remained of the propeller was lifted out whole. The rudder post was cut through at the bottom; at the top two small sections of plate were left fast to the post for facility in handling. The sideplates were cut down to approximately 3 feet above the water line.

With a ship stripped virtually to the tank top, it took its last water journey. It was towed a few feet to the floating drydock, where the double bottom was lifted clear of the water. Most of the double-bottom sections were lined with concrete, a precaution taken when the ships were built to protect the metal from such water as would accumulate in the hold. It was necessary to remove this concrete where the cutting was to be done. Small sections of plate were cut from the tank top across the beam of the ship just large enough for men with pneumatic drills to be able to chip out the concrete in 3-inch channels.

Burners followed those men, and cut the double bottom into sections approximately 6 feet wide. The length of the sections varied according to the part of the ship they were taken from, the bow and the stern naturally being smaller than the midship portions. The length of the midship sections was about 43 feet 6 inches. After being cut the double-bottom sections were lifted from the drydock, loaded three deep on flat-cars and taken to the storage yard where they awaited their turn at the open-hearth furnaces.

In those double bottoms where oil had accumulated, notably in the ships of the submarine-type, additional difficulties were encountered. No matter how thoroughly the double-bottom tanks were pumped a heavy coating of oil would remain over the whole inside surface, and use of the torch would inevitably result in a disastrous fire. This necessitated first cleaning these double bottoms by a patented process, a slow and expensive undertaking. Oil thus removed, however, was salvaged.

Large quantities of "clean steel" were salvaged from ships, "clean steel" being that which could be used direct in construction and other work without being put through the furnaces. This was unloaded upon the



Engines, lifted out intact after deck plates were removed, were salvaged for use in Ford plants at home and abroad. Marine boilers, carefully salvaged, have been shipped for service in Belgium and France

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main dock, where a crew of men with pneumatic air guns knocked off the rivets. The clean steel was then sent to a special stock yard. The rivets and broken bolts were melted for their metal. Other steel was loaded on flat cars from the ships and taken immediately to the storage yards.

Approximately 1050 men were employed in the dock dismantling operation in 1927; and about 1600 in 1926.

Steel totaling 216,532 net tons was recovered from the 181 ships dismantled, 144,532 tons coming from those scrapped at Fordson and 72,000 tons from those taken apart at the East coast shipyards. Large quantities of the steel were used direct in new construction work. Of that sent to the furnaces, approximately 88 per cent went to the open-hearth building. The remainder, too large and too heavy for the open hearth's cutting equipment, went to pig-casting machine.

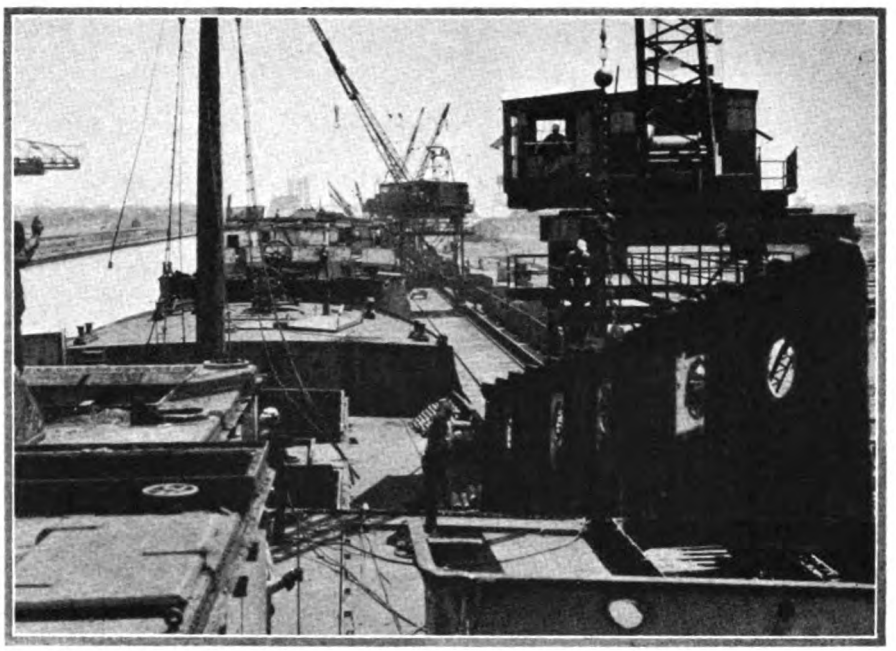
During the period of dismantling, the open hearth and pig cast obtained their scrap directly from the dock, 35 to 45 carloads being hauled to the furnaces each day. This method saved handling the scrap in and out of storage. The furnaces, however, could by no means accommodate all the metal as it was taken from the boats, and great piles were stored.

By the end of 1927 the open-hearth furnaces had melted 39,935 tons of ship metal, and were at that time using about 6000 tons a month. Indications were that it would be 1929 before the last of it was melted.

Metal sent to the pig-casting plant, usually great keel sections, was cut by torch into pieces weighing 6000 pounds or more each. These chunks were melted by being suspended in ladles of hot blast-furnace metal. It was found that about 6000 pounds of ship metal could be used efficiently with 75 tons of iron. About 600 tons of ship metal a month was being so converted early in 1928.

At the open hearth, ship metal of large size was cut to charging-box size by the steam hydraulic shear, which had a rated pressure of 1000 tons and a cutting capacity of 225 to 300 tons in 24 hours. Smaller stock was cut by a mechanical shear capable of disposing of about 120 tons in a 24-hour day. Two small plate shears and an alligator shear completed the cutting equipment.

The larger ship stock was unloaded from the flat cars by crane and magnet on a slat conveyor controlled from the operating station of the 1000-ton shear. This conveyor delivered the stock on the shear's V-shaped anvil. The conveyor was so balanced that its discharge end could be sunk by motor to a point where it would not interfere with the stock on the anvil.



Section of bulkhead being removed with a crane at one of the disassembly positions

The stock was crushed with the wedge-shaped rear portion of the shear head. First the conveyor moved it forward until it projected over the forward edge of the anvil. Then the shear head descended, cutting the crushed stock away with its forward portion (which was the blade), while the wedge-shaped rear portion crushed the stock on the anvil.

Loading Into Charging Boxes

A discharge conveyor delivered the cut stock into charging boxes placed on two cars holding eight each. The cars were moved backward and forward beneath the edge of the conveyor by a control located in the conveyor operating station. A crane lifted four full boxes at a time and elevated them to the charging floor, placing them directly on cars which were hauled by electric locomotives.

Clean steel taken from ships included girder, sheet, channel, angle, flat bar and round stock. From the LAKE WINONA, dismantled in 1927, 337 tons of clean steel was salvaged, divided roughly as follows: Plate, 247 tons; channels, 71 tons; angles, 19 tons. This is a fair average.

Shell plating, deck plating and ceilings furnished large sections of clean steel; smokestacks, bulkheads and superstructure all contributed. Rivets were knocked out at the dismantling dock, after which the sections were conveyed to a special storage yard to await use. In reclaiming the steel, interesting methods were used.

It was found desirable to plug the rivet holes for many of the purposes to which the steel was put. This was accomplished originally by welding. Later a special machine was installed for plugging the holes with steel slugs; and a 50-ton "bull riveter" used.

Four men were required for the operation of the machine, the capacity varying according to the size of the material and the number of pieces to be handled. The machine was run from a roller trackway on an overhead crane and could be swung into any position desired. The various sized pieces of material rested on horses at a convenient height.

One man, who controlled the movements of the machine, swung the jaws over the rivet hole in which another workman had previously placed a steel slug corresponding to the size of the hole. Steel burrs taken from various punch presses were advantageously used in this way.

Another workman controlled the actual operation of the machine. One lever regulated the air which opened and closed the jaws which pressed the slug into the hole, flattening it on each side by the application of a pressure of 50 tons. Another regulated the minimum size between the jaws; by gradually closing this and with a series of thrusts the slug was forced into the hole and expanded firmly.

The excess metal was later trimmed off and after painting it was difficult to detect the repair.

A hydraulic butt-welding machine was used to weld sections of I-beams of the same size together. These were usually fabricated to the exact size desired for a certain purpose.

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Pipe was straightened in this machine, then welded into suitable lengths for shop use

The beams were taken from the ships in varying lengths. Welding the shorter pieces together into a desirable length saved cutting longer pieces.

The machine was capable of handling material of all ordinary sizes of structural steel. Its surface welding capacity was 64 square inches; and some of the larger pieces required 100,000 amperes or more. The two pieces to be welded together were squared on the ends and placed in the machine by an overhead crane.

They were then securely clamped into place on the moveable carriage, the operation of which was controlled by hydraulic pressure. When the current was turned on, the two ends were brought together under pressure forming an arc which thoroughly fused the two sections into one piece, strong in every way as new material.

Seventy-five per cent of the company's channel iron needs at the Fordson plant were being supplied with material from the ships early in 1928. In angle irons the proportion was approximately the same. In plate about 95 per cent of the stock was coming from the ships. "Strongbacks" from the hatches were used as I-beams for balconies.

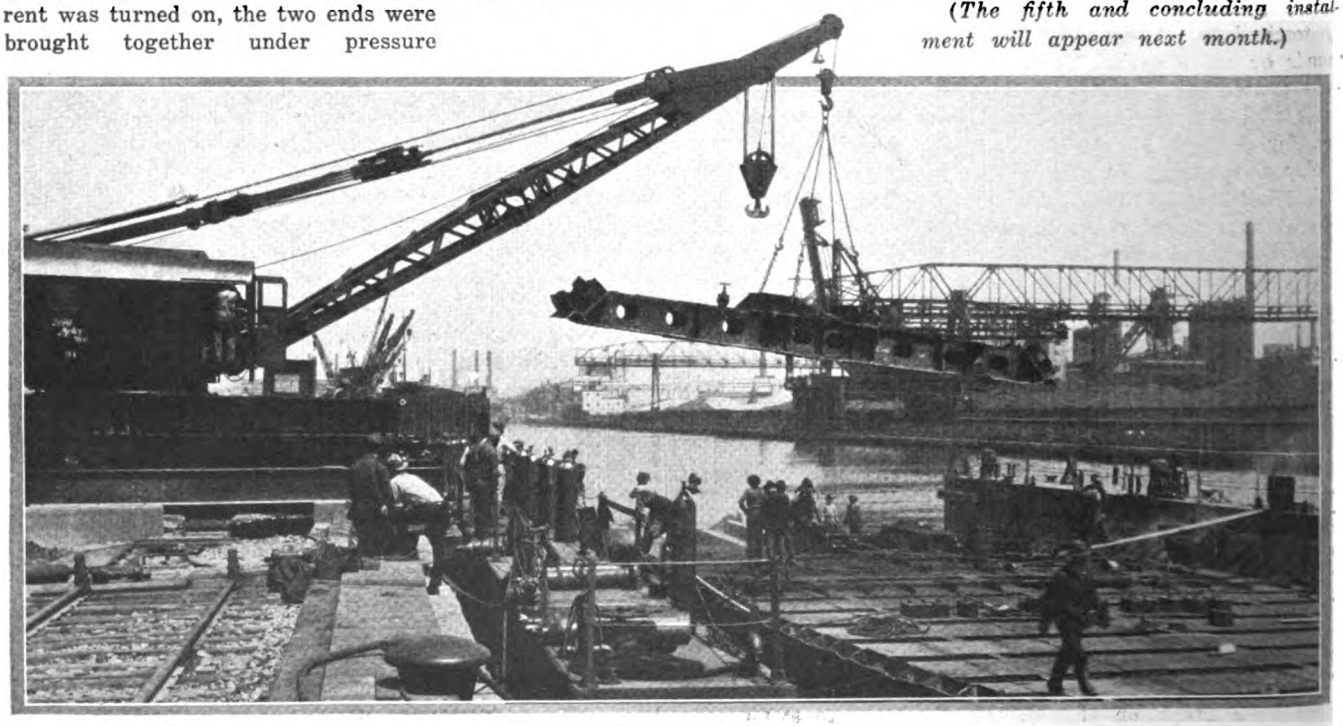
Rudder plates were used as liners in gondola-type railway cars belonging to the company. They represented a saving of $30 a car over the liners formerly used, and an increase of 200 per cent in durability. Ship plate was used in the construction of coke-oven chutes. Machine steel from boat davits, steering gear, etc., was rerolled and put into various uses. Boiler plate was rerolled into ⅛-inch stock for production purposes.

Sections of tail shafts approximately 8 feet long were put into pipes along with coke and charcoal and annealed. This generally took from 12 to 16 hours, depending upon the quality of steel required. It was removed, tested, and then heated sufficiently for forging. By means of a huge hydraulic press it was forged to stock 2½ inches square or 3 inches square. Metal thus reclaimed was of exceptionally high quality and was used for tool steel.

Some of the ship plate was rolled to desired thickness and stamped or forged into parts for the tractor and the Model T car. Among the parts thus made were clutch lever (forging); steering gear dash cover plate; connecting rod (forging); tractor draw bar extension (forging); engine pan, right and left; frame side, right and left; and toe board riser, right and left.

About 15 tons of nonferrous metal was recovered from each ship. Babbitt was remelted, reworked to standard formula and used as production stock. Brass bars were rerolled and sent to stock for use where needed. Copper bars were rerolled. Some were used as bus bars by the electrical department. Lead was recovered from batteries and pipe. Tin came from ventilators and other sources. Bronze was rerolled into sheets and bars.

(The fifth and concluding instalment will appear next month.)



In the final stage of disassembly sections of double bottoms were cut from the hulk while in dry dock

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Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	545	2,424,887	543	2,362,154
August	580	2,533,877	622	2,733,727
July	602	2,526,107	564	2,415,168
June	537	2,386,509	602	2,645,954
May	580	2,498,280	590	2,463 196
April	566	2,487,959	541	2,359,979
March	548	2,338,855	578	2,449,705
February	513	2,205,204	501	2,135,910
January	540	2,160,576	512	2,146,026
December, 1927....	436	1,770,154	548	2,222,409

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	84	238,234	43	122,389
August	96	266,104	58	161,365
July	101	254,378	60	143,573
June	101	270,069	72	183,534
May	110	281,648	74	179,108
April	109	261,735	60	140,547
March	95	254,304	65	167,100
February	88	239,768	53	152,545
January	81	206,710	54	141 408
December, 1927.....	81	206,171	42	108,935

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	113	383,749	77	245,068
August	130	340,569	107	2.0,757
July	155	378,368	111	289,121
June	143	319,611	100	254,906
May	134	304,575	103	2.1,551
April	110	343,360	65	205,257
March	108	348,026	67	194,408
February	100	301,053	50	160,330
January	102	328,779	61	197 133
December, 1927.....	91	255,980	52	169,150

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	30	53,338	30	51,018
August	30	48.256	28	47,078
July	38	68,208	38	66,389
June	30	40,255	25	33,834
May	23	26,648	19	28,673
April	20	51,854	19	50.175
March	20	58,110	22	60,400
February	18	44.067	17	47,032
January	21	57,757	18	48.294
December, 1927.....	23	50,380	23	55,280

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	5	18,895	3	12,777
August	....	.....	....	.....
July	8	26,920	7	25,451
June	8	35.177	7	25,741
May	7	21.068	4	12,765
April	4	15,670	3	12,362
March	7	27,885	6	26,037
February	3	6.656	4	17,543
January	4	20,931	4	18,817
December, 1927.....	4	11,618	5	21,125

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	41	150,368	57	203,758
August	35	136,504	47	172,693
July	30	111,042	46	157,354
June	23	85.328	40	144,572
May	25	96,976	44	159,070
April	37	137,821	41	152,042
March	29	111,490	49	170,655
February	23	86.160	35	120,026
January	37	130,578	50	188,254
December, 1927.....	34	134,562	61	228,472

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	119	374,500	128	396,749
August	133	404,303	144	440,016
July	128	378,827	121	353,758
June	127	392,580	135	412,620
May	135	413,038	151	439.278
April	140	396,942	134	394.124
March	128	391,117	137	408,927
February	134	412,110	135	399,729
January	116	354,307	120	374.617
December, 1927.....	129	406,889	132	398,587

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	21	64,366	69	178,508
August	19	50,0'6	83	208,639
July	15	33,548	81	212,471
June	19	42,454	63	155,944
May	25	68,472	78	207,857
April	15	35,122	81	189,564
March	18	39,102	89	209,171
February	13	32,925	77	206,630
January	14	29,831	75	202.997
December, 1927.....	17	35,439	78	207,636

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	40	89,032	42	94.981
August	37	85,186	34	83,694
July	30	81,634	31	79.222
June	26	54,449	28	57,111
May	26	58,800	28	63,779
April	26	68,581	26	61.939
March	25	65,435	28	68,630
February	31	70,881	28	58,896
January	26	71,686	27	71,721
December, 1927.....	25	59,744	27	72,636

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	84	60,079	86	62,698
August	91	73,771	89	69,532
July	86	65,838	88	67,720
June	98	83,417	93	78,006
May	134	117,930	129	112,303
April	101	75,140	102	76,450
March	119	96,746	112	94,408
February	121	91,928	109	88,819
January	110	85,955	123	85,750
December, 1927.....	103	91,299	101	90,557

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	85	209,709	74	193,661
August	90	186,09?	78	178,036
July	101	209,990	82	189,008
June	85	176,088	82	178,337
May	102	227,194	90	209,449
April	114	217,803	105	203,515
March	107	242,444	97	246,634
February	94	271,569	83	226.210
January	117	309,644	82	216,381
December, 1927.....	75	189,231	73	178,068

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	57	229,718	66	254,503
August	55	220,858	53	228.378
July	64	261,850	58	228,946
June	44	180,482	44	185,765
May	53	206,254	61	239,241
April	56	226,257	54	210,908
March	46	191,601	46	196,871
February	54	210,176	53	207,173
January	50	206,743	62	239 133
December, 1927.....	56	232,726	58	241,898

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	228	617,636	248	661,643
August	264	667,055	265	690,341
July	260	659,457	245	615,234
June	253	615,672	263	640,186
May	263	671,333	261	647,504
April	254	656,537	265	666,345
March	265	669,301	282	720,407
February	238	627,445	236	616,772
January	271	725,935	272	697,801
December, 1927.....	240	671,775	258	714,455

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
July, 1928	26	59.204	27	61,976
May	29	71,467	32	78,781
April	26	60.165	21	52,590
March	29	79,789	27	67,472
February	26	74.244	27	73,168
January	32	83,419	52	150,260
December	27	65.379	25	63,354
November	32	77.911	33	81,978
October	37	95,473	36	95,070
September, 1927 ..	39	102,374	39	101,044

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	26	69,433	98	313,816
August	31	91,959	78	261,804
July	41	91,686	68	196,424
June	20	52,884	64	210,110
May	35	96,852	44	126,027
April	32	85,685	43	132,534
March	35	75,924	47	121,106
February	27	63,696	52	147,378
January	32	83,419	52	150 260
December, 1927.....	34	79,353	51	142,779

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	188	504,630	189	482,133
August	164	539,454	160	514,978
July	153	547,612	131	485,817
June	152	434,811	114	428,885
May	236	545.132	150	478,553
April	183	519,918	184	498,424
March	182	522.110	222	488,105
February	164	466,319	172	439,193
January	167	477,974	165	437,080
December	195	561,525	158	517,376

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1928....	180	623,999	175	579,262
August	185	674,832	164	643,965
July	147	662.437	122	454,802
June	149	567,839	141	539,600
May	174	869.626	175	625,910
April	157	580,506	150	565.111
March	179	629,773	162	648.057
February	158	501.080	165	640,220
January	145	602,389	154	607,904
December, 1927.....	171	665,944	158	631,872

Port Arthur

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1928	24	78,538	33	109,230
June	25	80,481	25	79,758
May	27	92,323	28	90.108
April	24	73,693	26	88.253
March	46	127.039	47	131,741
February	47	144.273	44	144,508
January	20	69.947	20	72.185
December	23	67.105	21	68,602
November	21	64.277	25	80.084
October	18	50.632	25	82.177
September, 1927 ..	16	51.492	29	83,728

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 52 of 185,833 net tons entered and 56 of 188,328 net tons cleared for the month of August.

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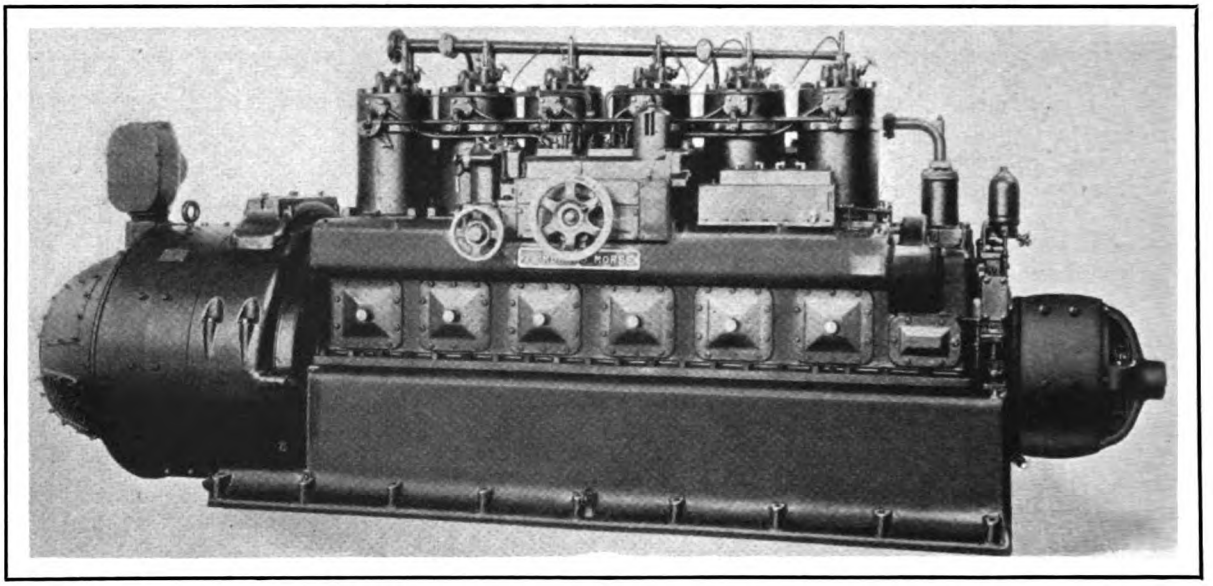

Direct Connected 360 horsepower Diesel Engine generator and Exciter for Variable Control

Increase Diesel Drive Efficiency By Correct Application

By D. L. Arnold

IN THE past few years there has been a marked improvement in the application of diesel engines for marine service. The diesel engine has always been a remarkably efficient prime mover but, unfortunately, full advantage has not always been taken of this efficiency in marine work. Detailed studies by the engine builders, as well as by naval architects and shipbuilders, with respect to both hull design and selection of propellers in relation to diesel power have made it possible to get better efficiency out of the completed job.

Then also there have been improvements in the engines themselves and in the details of their application. Improved clutches, transmission with power take off, double end drive with and without clutches, improved pilot house control, built-in auxiliaries, higher speed, combination units for auxiliary service and developments in diesel electric drives have all had a bearing on the solution of the marine diesel application problem.

The Model basin at the Washington navy yard has been of great importance in increasing propulsive efficiency. Practically all the propeller data available previous to the last two or three years has been for high powered vessels such as naval craft, passenger liners and large freighters. Furthermore, performances given were for slips up to 40 or 50 per cent. Such data has not been particularly suited for application to diesel power. In steam vessels the boiler pressure and capacity prevented engines from being dangerously overloaded. The flexibility of a steam engine is such that only a large error necessitates a propeller change. This is not the case with the diesel engine for the propeller must be very accurately selected if overloads are to be avoided.

Better Propeller Data Obtained

As a result of very extensive investigations on propellers for hulls of smaller size and slower speed and for slips up to 100 per cent, it is now possible for the engine builder to cooperate very closely with the naval architect and the shipbuilder in application of the diesel engine to different type hulls and for different service requirements.

Much work has also been carried on in connection with bow propellers for double end drive. Such a propeller works off the reverse side of the propeller blade and meets water flowing very differently from that at the stern. It also discharges water against the bow in such a way as to increase the ship resistance and this increase of resistance of the ship and the decrease of the power to turn the bow propeller have both been closely approximated for diesel purposes. Special propellers have also been designed and tested which in some cases will so increase the work done by the bow screw that nearly equal work is done at each end of the ship.

The diesel engine lends itself readily to all kinds of propulsion work and it is doubtful if there is a type of vessel in commercial service to which it has not been successfully applied. From 10 horsepower up to engines of several thousand horsepower the diesel engine is being applied in all types of hulls and in all types of service. With the extension of the range of ratings there has also been a constant development in the details of the drives. These developments have had a particularly important bearing on the installation of the diesel power throughout the field represented by towboats, lighters, tankers, ferry

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This article was written for MARINE REVIEW by D. L. Arnold, Disel Engine division, Fairbanks, Morse & Co.

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boats, dredges, derrick boats, fishing craft, stern wheel towboats, small freighters and other similar types.

Various conditions of service such as the paddle wheel boat and auxiliary schooners have required the development of a clutch mechanism so that the engine may be disconnected from the propelling shafts. The accompanying photograph illustrates one type of clutch developed for this service and is so arranged that it may be controlled either from the pilot house or from the engine room. In the smaller types of engines and for engines in the fishing trade, where extremely slow speed is desired and yet where long runs must be made at the highest speed possible, there has been a two speed transmission developed, shown in an accompanying illustration. A special power take off is provided in this transmission to run such auxiliaries as the fishermen may desire to operate with power.

Pilot house control has been developed by the engine builders until it is now possible to mount a small pedestal in the pilot house which gives complete control of the engine unit with practically the same flexibility as diesel electric drive. The simplicity of one of these pilot house controls is shown in an accompanying illustration. The left hand lever on this pedestal is used for reversing the engine for ahead or astern rotation while the right hand lever gives any speed desired from dead slow to full speed ahead. With this type of equipment reversing may be accomplished from any predetermined speed.

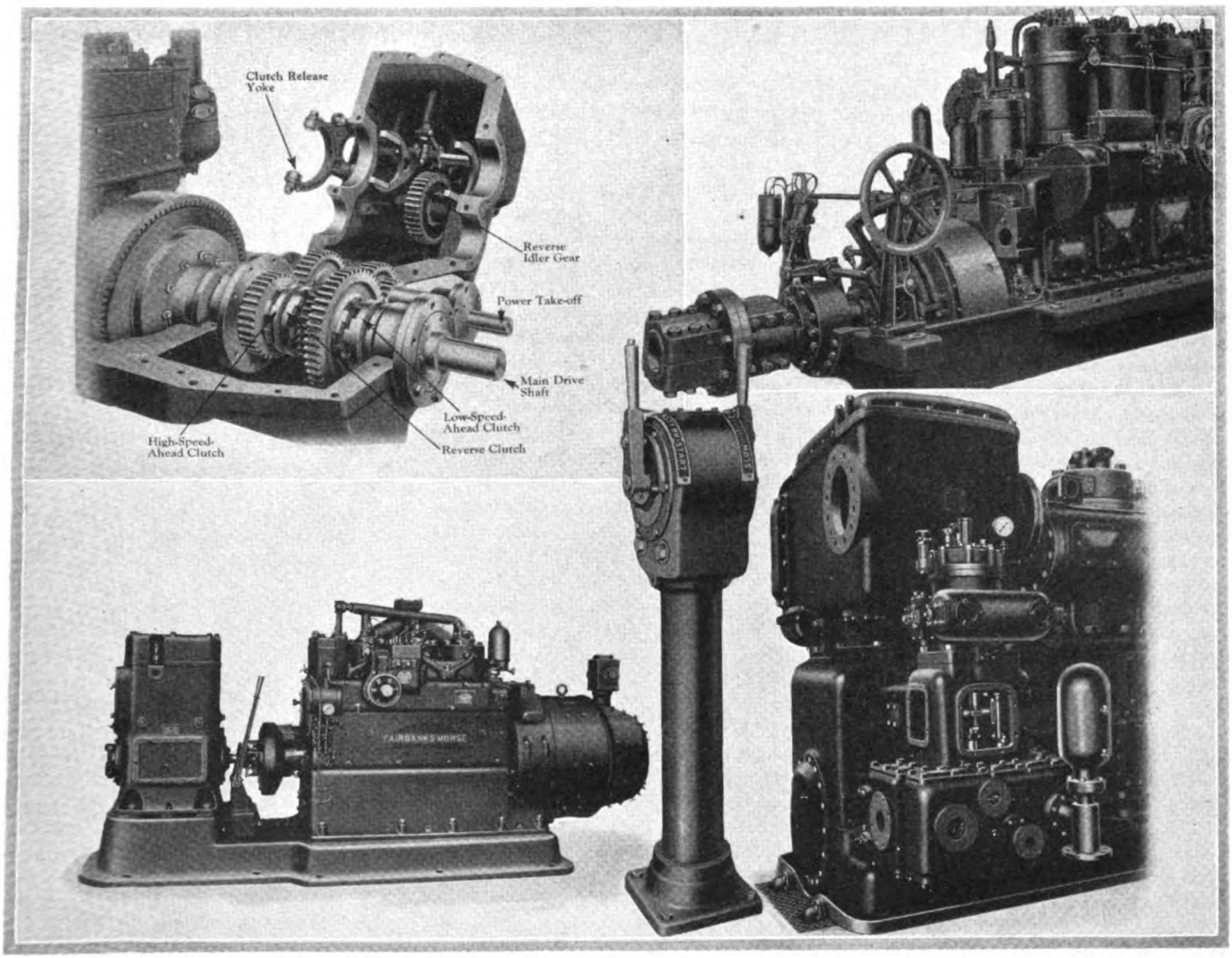
Compact Auxiliary Equipment

Considerable attention has also been given to auxiliary equipment for the main engine. Compact diesel electric units are now available for the operation of electrified auxiliaries and they are also built in combinations with compressors as shown in one of the accompanying illustrations. Auxiliary units of this type are of much higher speed and are much lighter in weight than were formerly available. The engine shown in the illustration operates at 800 revolutions per minute.

Complete built-in auxiliaries for the main unit have been growing in popularity. There are several reasons for the preference of built-in auxiliaries in certain types of installations. Less elaborate auxiliaries with independent drive need be provided in order to meet the classification societies' requirements for duplication of equipment essential to the operation of the main propelling engine. Also the installation of single rather than double auxiliaries of the independent type nearly always makes possible a simplification of the engine room layout. Aside from considerations of safety the most important actual use of independent auxiliaries is that of providing oil and water circulation just before starting up the main unit and while the latter is still warm after shutting down.

The operation of the built-in auxiliaries is materially simplified because the problem of supplying them with power never arises in a practical way;

(*Continued on Page* 86)



Upper left—Two speed transmission with reverse and power take-off for driving auxiliaries. Upper Right—Air-oil operated clutch controlled from engine room or pilot house. Lower Left—Direct connected 27 kilowatt diesel generating set with clutch connection to 54 cubic feet two stage air compressor. Lower Center—Pilot house control pedestal for starting, stopping, reversing and speed control. Lower Right—Two stage air compressor and pump bolted to side of scavenging pump crankcase

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Ask Bids for New Ships for Mediteranean

The Export Steamship Corp., 25 Broadway, New York, on Sept. 28 issued plans and specifications for four 14-knot, turbine driven passenger and cargo steamers. Bids will be received from the Bath Iron Works, Bath, Me.; New London Ship & Engine Co., New London, Conn.; Bethlehem Shipbuilding Corp., Bethlehem, Pa.; Federal Shipbuilding & Dry Dock Co., Kearny, N. J.; New York Shipbuilding Co., Camden, N. J.; Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; Sun Shipbuilding & Dry Dock Co., Chester, Pa.; Maryland Dry Dock Co., Baltimore, Md.; and Spear Engineering Co., Ltd., Norfolk, Va. The bids are to be opened Nov. 5 in the offices of the Export Steamship Corp.

The projected vessels are to be operated in the American Export line service between New York and Egyptian ports and the Levant. This program has the distinction of being the first which has gotten to the point of asking bids on vessels to be built for ocean service under the terms of the Jones-White law. Two factors materially helped the company in going ahead with its plans for these new ships. In the first place it has been awarded a ten-year mail contract which became effective Aug. 1 this year; in the second place a loan from the government of 75 per cent of the cost of construction of these vessels has been assured the company.

Nothing in the plans and specification of these vessels is revolutionary but many features found desirable from practical experience are incorporated. The actual plans and specifications were prepared by the New York naval architects, Donald & Sharp in close consultation with H. E. Frick, vice president and general manager of the steamship company.

The vessels are to be single screw, turbine reduction gear drive, oil burning watertube boilers with a steam pressure of 325 pounds and 150 degrees, superheat. The dimensions are: Length, 450 feet; beam molded, 61 feet 6 inches; depth to shelter deck, 42 feet 3 inches; gross tonnage, 8200; deadweight tonnage, 9500; loaded draft, 27 feet 10 inches. There will be seven cargo holds, one of which will be for refrigerated cargo with a capacity of about 30,000 cubic feet. Accommodations are to be provided for 100 passengers. The public rooms will be spacious, comfortable and attractive in every way. Needless to say the vessels will be modern in every respect and they are to be built to the highest class in the American Bureau. They will also meet the requirements of the navy department for naval auxiliaries. The cost is estimated at about $1,500,000 each.

Lord Kylsant's Visit

Lord Kylsant, one of the leading figures in the world of shipping, arrived in New York, Oct. 23, on the White Star liner, MAJESTIC. This is his first visit to the United States since 1904.

He began his shipping career more than 40 years ago and he has been chairman of the Royal Mail Steam Packet Co. for the past 25 years. He is also chairman of the White Star line, Union Castle line, Pacific Steam Navigation Co., Lamport and Holt Co., Elder Dempster & Co., and also of Harland & Wolff, shipbuilders.

Much interest has been aroused in Lord Kylsant's visit to the United States and there has been some talk that the International Mercantile Marine Co. will at this time negotiate with him for the sale of its remaining foreign flag ships.

Certified for Mail

The shipping board on Oct. 16 authorized the certification of vessels for a mail route from Savannah to Bremen and Liverpool, in response to a certification by the postmaster general covering the said route. The board certified that vessels presently available are cargo ships of 5000 gross tons and capable of maintaining ten knots at sea in ordinary weather. For the permanent service, the board certified that it should be provided by vessels primarily for the transportation of cargo, but with provision for a proper amount of refrigerating space and for limited passenger accommodations, of a size not less than 3000 gross tons and of a speed not less than 12 knots.

The provision was made that three vessels of this type should be substituted for those temporarily accepted, one such vessel to be put in service during the fourth year of the contract, one during the seventh year, and one during the ninth year. The certification also contained provision that upon mutual consent of the parties to the contract, it could be amended providing for larger and/or faster ships.

Walter Castanedo Inc., 1115 Maritime building, New Orleans, has been appointed as agent in Louisiana and Mississippi, for the Peabody Engineering Corp., New York.

N. Y. Shipbuilding Co. as Separate Unit

Effective Oct. 1, the American Brown Boveri Electric Corp. announced the separation of its electric and shipbuilding activities by the organization of a subsidiary completely owned under the name of New York Shipbuilding Co. This restores to the famous shipyard at Camden, N. J., its old well known name under which it had gained much distinction.

All of the real estate and plant embraced in the active shipbuilding facilities at Camden is being leased to the new company. It will continue and complete all existing ship contracts for the American Brown Boveri Electric Corp. This work consists of the United States scout cruisers, SALT LAKE CITY and CHESTER and the machinery for the scout cruiser, PENSACOLA building at the New York navy yard. There are also orders for carfloats and steam lighters for the Pennsylvania railroad.

The management of the New York Shipbuilding Co. as now organized includes W. W. Flook, chairman of the board, C. L. Bardo, president, J. E. Slater, vice president and treasurer, E. I. Cornbrooks, vice president and general manager, M. H. Torbet, assistant general manager, E. H. Rigg, naval architect, Norman R. Parker, comptroller, A. G. Connell, secretary.

Port Authorities Meet

The American Association of Port authorities is to hold its seventeenth annual convention at the Rice Hotel, Houston, Tex., Nov. 12, 13 and 14 and at Galveston, Tex., Nov. 15.

Papers relating to port subjects are to be presented by qualified authorities. A large attendance is expected on the part of port and terminal officials and others directly interested in these problems. Port officers from all sections of the United States and Canada will meet there. For further particulars communicate with Tiley S. McChesney, New Orleans.

American Shipbuilding

Counting everything, which includes barges, carfloats, etc. the department of commerce figures on American shipbuilding as of Sept. 1 show that at that time there were building or under contract to build for private ship owners 438 steel vessels of 208,786 gross tons as compared with 377 steel vessels of 213,817 gross tons on Aug. 1. The vast majority of these vessels are non-powered barges, carfloats, etc. used on rivers and inland waters.

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Electric Winches Show Economy

Materially Lower Cargo Handling Costs—No Cold Weather Troubles—Less Up-keep Expense—Positive Control Increasing Safety to Personnel

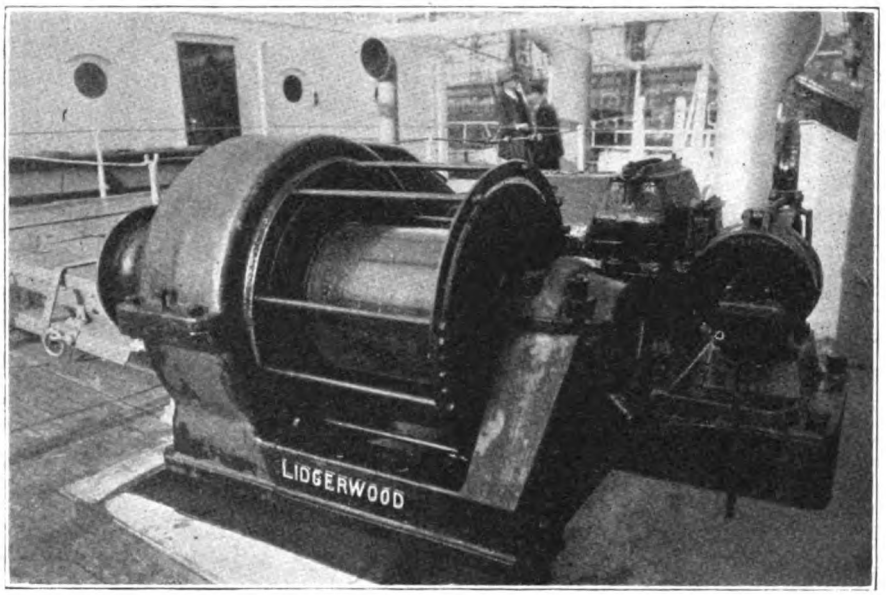
By S. S. Williamson

ORIGINATING in 1904, when James J. Hill introduced electric cargo handling on the DAKOTA and MINNESOTA, the use of electric winches has won general acceptance as a prime factor in the reduction of cargo handling expense.

Ship operating companies, with opportunity to study the performance of both steam and electric winches under similar conditions, have reported decreases of over 90 per cent in port fuel consumption for their electric-winch equipped ships as compared with the ships using steam winches.

The present electric winch is wholly designed for ship service, where the keyed drum type is almost universally favored. In this type, the gearing must be heavy, the shafting of generous section, the electric parts above deck watertight, and the winch operator, the load, the tackle and the winch mechanism must be protected under all operating conditions.

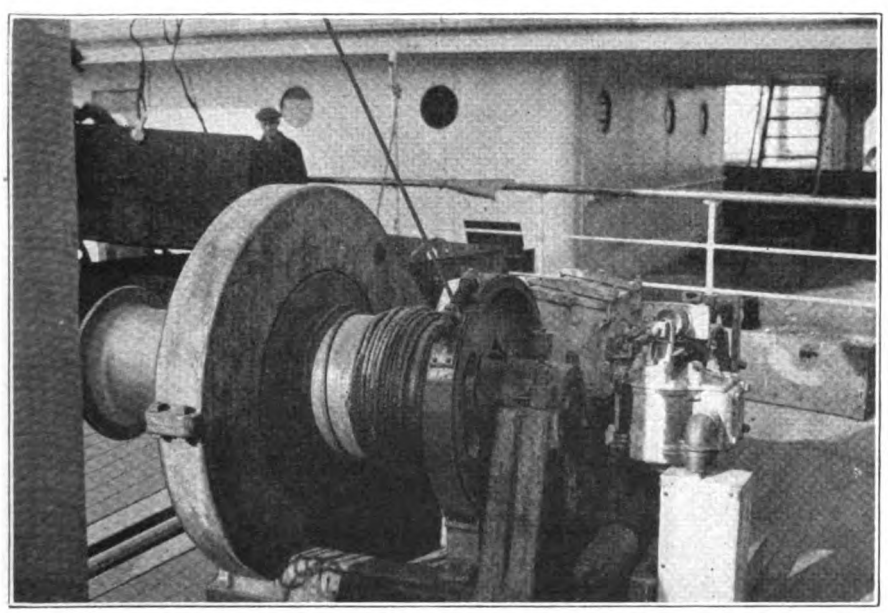
The standard winch which has been most used in diesel conversion has a double reduction of spur tooth gearing from motor to drum, providing a speed of 170 feet per minute for hoisting a hook load of 4000 pounds. One-ton loads are handled at 240 feet per minute and loads of five tons are safely hoisted on a single line. The electrical equipment consists of a 25-horsepower, watertight motor, a full torque watertight solenoid brake mounted on the motor armature shaft, and a reversible watertight master controller which operates the control panel usually placed, with the resistors, below deck. Dynamic braking on the pay-out direction of the controller governs the lowering of the load. In the event of power failure from any cause, the solenoid brake holds the load safely until service is restored.



ELECTRIC DRIVE WINCH WHICH HAS BEEN GENERALLY USED IN DIESEL CONVERSION

This article was prepared for MARINE REVIEW at the request of the editor. The author, S. S. Williamson, is a member of the staff of the Lidgerwood Mfg. Co.

The frame casting of the winch sweeps up to form an oiltight housing around the driving gears, protecting both the gearing from foreign material and the rope from being cut by the gear teeth. The electric winch also has the advantage that the gearing runs in a constant bath of oil. The drum shaft is carried on long bearings provided with removable bronze bushings, flood lubricated. To this drum shaft is keyed a drum 16 inches in diameter, 20-inch face, with 36-inch diameter flanges, and a winch head 12 inches in diameter.



SINGLE REDUCTION HIGH SPEED ELECTRIC CARGO WINCH ON M. S. EAST INDIAN

Thoroughly Protected Gearing

The standard winch as installed on the 12 shipping board ships when they were converted to diesel operation, is equipped with a rope guard for the drum. In other installations foot brakes contacting on the drum flange have been recommended where conditions indicated their desirability.

The foundation bolt holes on the electric winch are in exactly the same position as the standard steam winch so that no relocation is necessary in diesel conversion, when displacing a steam winch of the same builder's standard type.

A recent innovation in electric winch design has added a greater measure of cargo handling speed to

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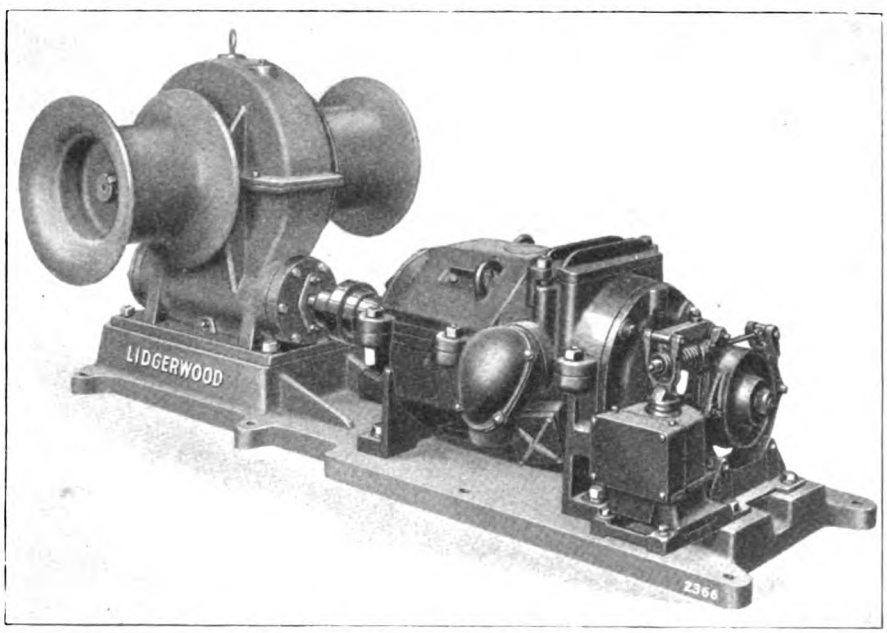
low fuel cost, making electrification even more attractive. The development of a slow-speed motor which would withstand heating for a severe duty cycle, made possible the production of a high-speed cargo winch with a single reduction of gearing. In its construction, the essential features of the double geared winch are retained and the foot brake is made standard equipment; the finished winch has proven highly satisfactory. The motor has a nominal rating of 25 horsepower at 310 revolutions per minute; these winches will handle a hook load of 1500 pounds at a speed of over 300 feet per minute. In actual service, these winches are capable of a continued output of about 65 tons per hour. The maximum single line load is three tons; two-ton loads being handled at a speed of about 185 feet per minute. The empty hook is returned for its load at about 500 feet per minute.



ELECTRIC BOAT HOIST FOR PASSENGER VESSELS WHERE FREQUENT BOAT DRILLS ARE NECESSARY

Use Single Geared Winches

The double geared winch is well adapted for the average ship or for greatly diversified cargo, but where cargo loads of 1500 pounds average must be hoisted into and out of very deep holds, more tonnage is obtained with the single geared winches.

Aside from the advantage of lower fuel cost, electric cargo winches are more compact, quieter and cleaner. The electric winch installation is always neat and orderly, and the trim, workmanlike appearance of these winches attracts much favorable comment.

Another type of electric winch which has a more limited field of application is the electric boat hoist for passenger vessels. During boat drills, the task of hoisting a number of life boats aboard by hand tackle is too laborious, and electric boat hoists are being installed to do this work. In the type illustrated, which is built in a range of duties from 1000 to 3000 pounds at speeds from 90 to 150 feet per minute, the motor shaft is directly connected by flexible coupling to the worm shaft mounted on antifriction bearings. Another type is driven by a double set of spur gearing; this winch is rated 4000 pounds at 200 feet per minute.

In both types, the drive is in oil bath, totally enclosed in oiltight housings, and both are fitted with brakes to hold the load should the power supply fail from any cause whatever.

To Build Sound Steamer

The Bethlehem Shipbuilding Corp. has received a contract to build a 250-foot twin screw steel passenger and freight steamer for the New England Steamship Co. The new vessel will be built at the Fore River plant at Quincy, Mass., and will be used in the Long Island sound service.

New Dollar Line Ships

Stanley R. Dollar of the Dollar Steamship line on Sept. 28, after the award to his line of the mail contract from San Francisco to Manila and Seattle to Manila, announced that bids would be requested for the building of three new ships, each to cost between $6,000,000 and $7,000,000. Mr. Dollar stated that the new vessels will be about 650 feet long and will have accommodations for about 350 passengers. The speed is to be in excess of 18 knots and propulsion is likely to be turbo electric much along the line of the CALIFORNIA and VIRGINIA. The first of these new vessels, it is expected will be ready for service in about two years. This means that the order will of necessity have to be definitely placed within the next nine months or so.

Efficient Steam Plant

The application of the Bauer-Wach system to reciprocating steam engined vessels in Great Britain is reported to show excellent results. The system consists of the use of an exhaust turbine fitted in connection with the existing reciprocating engines.

In the trials of the anchor line steamer, BRITTANNIA, fitted with Bauer-Wach exhaust turbines at the Beardmore yard, Dalmuir, for corresponding speed displacement and other conditions, the fuel consumption showed a decrease of 18 per cent over the best results formerly attained. This reduction amounts to 9 tons of fuel per day, estimated to mean over $30,000 per year on five round voyages of 42 days each to India and back. To clearly demonstrate the difference the first trials were run as a straight, single screw, quadruple expansion, reciprocating engined ship. Careful records were taken of the oil fuel consumed and of the power developed at 83.5 revolutions. Then a second trial under the same conditions of weather and course was held with the Bauer-Wach exhaust turbine in use with the results increased in efficiency noted above.

On the strength of its successful experiments with this system in England the Commonwealth and Dominion line, it is reported, do not intend to build any more ships at the present time but that eight or nine vessels of the present fleet are to go to Swan, Hunter and Wigham Richardson to have the Bauer-Wach turbines installed.

At the trials of the steamer BRITTANNIA, referred to above, A. Galbraith, deputy general manager of Beardmore & Co., Glasgow, said, "Just as the slow running turbines are being displaced by smaller and higher speed turbines, the fast running Beardmore-Caprotti, Bauer-Wach installation, with pulverized coal as fuel, will bring steam back into the front ranks."

It has been reported that four ferryboats operating in San Francisco bay have been fitted with stainless steel propellers. It is anticipated that the propeller efficiency will increase.

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Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review

By Harry Bowne Skillman

Attorney at Law

ONE claiming damages for collision on account of loss of earnings of tug during the period when it was detained for repairs has the burden of establishing loss of profits, said the court in the case of Newton Creek Towing Co. v. City of New York, 23 F. (2d) 486; and merely showing that the vessel was laid up for repairs and a statement of the vessel owner's business forms too speculative a basis upon which to assume that, had the tug been in good repair, she would have been employed.

* * *

IN THE case of Houston Towing Co. v. United States, 23 F. (2d) 528, it appeared that a tug assisting navigation of a steamship by towing ahead with a line, was directed by the pilot to go to port to correct a sheer of the ship to starboard. In doing so, the tug fell astern, tripped on her line and was dragged astern, coming into collision with the ship, causing her injury. It was held that she assumed the risk in executing the maneuver, which was a proper one, and that the fault was her own, in that she was not properly handled. Said the court: "It is an ordinary consequence of such a maneuver that, if the tug does not get away promptly enough to keep ahead of the ship, she is likely to be tripped, and it was the duty of those operating the tug to look out for the safety of the tug, to see that the line was so attached as to permit its being immediately cast off when danger became apparent, and to cast it off. It was not the duty of the pilot to warn the tug of danger arising from its own maneuvers; it was its duty to execute those maneuvers as prudence required under the circumstances as they developed. Had the tug executed the maneuvers properly, or had the captain ordered the line cast off when the danger was first apparent, no injury could have occurred. Or had the line loosened readily, when, even though late, he did undertake to do it, no injury would have occurred."

* * *

THE covenant of seaworthiness is to be determined when the ship breaks ground, and only then. It is measured by her fitness in all respects to fulfill the purposes of the voyage as then contemplated. Hence, if applied with literal strictness, a ship must from the outset be fitted in hull and gear for every stage of her voyage when she first breaks ground. This would in many cases be an onerous and idle imposition, because the earlier stages of a voyage may not require what becomes necessary thereafter. Hence has arisen in England the doctrine of a voyage in stages, marked by ports of call. This, as we understand it, means no more than that, when the demands upon her change as the voyage proceeds, she satisfies her covenant if she is fit at any port for that leg of the voyage immediately following. Recently it has been recognized in this country.—STEEL NAVIGATOR, 23 F. (2d) 590.

* * *

CARRIER agreeing to transport coffee from Brazil to New Orleans by a named steamer "or any other steamer" was under obligation merely to carry within a reasonable time, and what should be considered a reasonable time depends upon the facts and circumstances of each particular case.—Leon Israel & Bros. v. United States Shipping Board Emergency Fleet Corporation, 23 F. (2d) 786.

* * *

GENERAL average is defined in the case of EMILIA S. DE PEREZ, 22 F. (2d) 585, as a contribution by several interests engaged in a maritime adventure to make good the loss arising from voluntary sacrifices of part of the ship or cargo, in order to save the residue of the property or the lives of those on board from an impending peril, or for extraordinary expenses necessarily incurred for the common benefit and safety of all the interests in the adventure. It was held that where, after a steamship arrived at destination and while the cargo was still on board, fire broke out and the master caused water to be poured into it, which damaged some of the cargo, but resulted in extinguishing the fire and saving the ship and rest of cargo, such acts were within the definition, and the steamship and owner and cargo became liable to contribute to general average for the value of the cargo damaged or destroyed.

* * *

THE owner of a tug, whose master, in going aboard a vessel as pilot, was acting independently as one in the employ of the vessel, and not within the scope of his general employment, was not liable for collision resulting from faulty navigation.—MARGARET, 22 F. (2d) 709.

* * *

THE basis of salvage awards is the service rendered, it was held in ELKRIDGE, 24 F. (2d) 147. "Hence," continued the court, "it is quite as erroneous to say that loss of life is to be compensated, as in an action for negligently causing death, as it is to say that there can be no consideration given to the accident, because the men were careless of their own safety. The entire situation must be judged, with all its attendant circumstances, including the accidental loss of life, in an effort to arrive at a just determination of the fair and reasonable value of the salvage service rendered. The elements of value are the value of the ship which was saved, the nature of the dangers from which the ship and her crew were rescued, the value of the salving vessel, and the dangers which she and her crew incurred in performing the service. The skill, promptitude, and success with which the service was performed, the additional labor imposed upon the members of the crew of the salving vessel, her loss of time and out of pocket expense, must also be taken into consideration." In the instant case some difficulty arose because of the length of the towage, as compared with the value of the property saved, but in considering such a case, the court said, it must not be forgotten that the service was necessary to save the ship, which was worth nothing if abandoned to her fate, and for that reason too much emphasis should not be placed upon the percentage of salved value to be awarded, but the service rendered must be fairly compensated, even if the owners who have recovered their property find the payment burdensome.

* * *

AN AGREEMENT to deliver liquor transshipped at a point on the high seas did not amount to a charter of the whole vessel, nor the demise of the ship, constituting the charterer the owner *pro hac vice*, and putting the vessel entirely in his control so as to subject the vessel to forfeiture. —HAZEL E. HERMAN, 24 F. (2d) 27.

* * *

WHILE shipping articles are mercantile documents, and entitled to liberal construction in order to carry out the intentions the parties had in mind, still a seaman, when asked to sign, is entitled to know what kind of a voyage the master is planning to undertake, it was declared in the case of THOMAS TRACY, 24 F. (2d) 372; but they may reserve on their face, if need be, sufficient latitude for events which may subsequently arise from the exigencies of a successful participation in carrying out trade. The articles, when in doubt, are most strongly construed against the ship. Seamen who leave the ship by desertion are subject to forfeiture of wages. But they are entitled to the benefit of doubts which may exist.

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Late Flashes On Marine Disasters

Brief Summaries of Recent Maritime Casualties— A Record of Collisions, Wrecks, Fires and Losses

Name	Date	Nature	Place	Damage Resulting
Aranda	July 16	Disabled	St. Johns	rud. stock
Alida Hearn	July 19	Capsized	Narragansett Bay	
Aagot	July 2	Aground	Buenos Ayres	Floated
Angele Mabro	July 5	Disabled	n.w. Hartlepool	Machinery
Anigir	July 5	Disabled	Malta	Machinery
Ameise	July 11	Struck sub. obj.	Hamburg	Propeller
Atalanta	July 13	Collision	Off Avonmouth	Not stated
Agwistone	July 25	Struck bank	Culebra Cut	Port side
Arracan	July 25	Fire	Malta	No. 3 hold
Alma Connors	Aug. 2	Ran on rocks	Chance Harbor	Not stated
Aldebaran	Aug. 10	Collision	Montreal	Bows
A. H. Ferbert	Aug. 9	Collision	Port Huron	Port bow
Andrew L. Hathaway	Aug. 9	Aground	Little Gull Island	Not stated
Angie & Vance	Aug. 10	Ashore	Great Brewsters	Floated
Adour	July 17	Collision	Traverse	Not stated
Arola Mendi	July 25	Aground	Buenos Ayres	Not stated
Anna C.	July 26	Aground	Punta Indio	Not stated
Benevolence	July 20	Ashore	No. Port Saunders	Bottom
British Renown	July 2	Collision	Suez Roads	Port bow
Bisley	July 1	Aground	Buenos Ayres	Not stated
Bingamon	July 4	Fire	Vancouver Island	Not stated
Boy Bob	July 17	Aground	Lambay Island	Floated
Breidablik	July 26	Struck pier	Manchester	Bow; plates
Black Diamond	July 28	Struck sub. obj.	Buffalo	Sank
Breedijk	July 16	Collision	Suez Canal	Port side
Bedecrag	July 29	Collision	Wielingen Channel	Bow
City of Victoria	July 16	Ashore	Lagoon Point	Not stated
Coast Guard 113	July 20	Collision	Philadelphia	Sank
Commercial Navigator	July 16	Fire	Galveston	No. 3 hold
Childs	July 12	Disabled	Nr. Southport NC	Not stated
City of Adelaide	July 3	Disabled	Tilbury	Machinery
Cairntorr	July 2	Collision	London	Not stated
Costantis Pateras	July 5	Aground	Rio Janeiro	Not stated
Colombia	July 9	Disabled	Bergen	Propeller; tailshaft
Cap Lay	July 19	Cyclone	Catba Island	Wrecked
Chancellor	July 31	Explosion	Clifton, S. I.	Not stated
Curacao	July 23	Fire	Seattle	Not stated
City of Tampa	Aug. 3	Collision	Nr. Tampa	Hold
City of Khios	July 19	Collision	Nr. Cape Roca	Not stated
Constant 2	July 18	Collision	Havre	Starboard bow
Christina	July 26	Collision	Tunis	Damaged
De Sota	July 15	Fire	Memphis	Total loss
D'Entrecasteaux	July 4	Fire	Nr. Cape Gardapie	No. 2 hold
Delta	July 19	Collision	Nr. Cape Roca	Nos. 2 and 3 holds
Enfield	July 3	Struck quay wall	Cardiff	Propeller
Energie	July 1	Ashore	Nr. Emea	Floated
Eastgate	July 23	Struck obj.	Gibralter	Plates
Eurana	Aug. 8	Collision	Baltimore	Not stated
Ellis	Aug. 1	Disabled	Mobile	Engine
Edward	July 18	Sank	London	
E. Rose	July 26	Collision	Antwerp	Starboard side
Falcon	July 26	Disabled	San Juan	Lost prop.
Floristan	July 2	Collision	London	Not stated
Faro	July 10	Ashore	Off Verdingsborg	Not stated
George & Earl	July 10	Ashore	Nr. Kings Point	Floated
Glitra	July 15	Ashore	Off Point du Lac	Floated
Gaitou	July 11	Ashore	W. of Langlande	Not stated
Gouveneur De Lantsheere	July 11	Aground	Buenos Ayres	Floated
George	July 13	Sank	Lancaster's Wharf	
Gypsum Prince	July 21	Aground	Windsor N. S.	Bottom
Grong	July 24	Collision	Garston	Plates
Gladys M. Taylor	Aug. 10	Aground	Off Cape Elizabeth	Not stated
Galveston	July 16	Fire	Texas City	No. 3 hold
Hartney W	July 14	Aground	Monomoy Point	Floated
Hauraki	July 26	Fire	San Francisco	Not stated
Homeside	July 2	Aground	Buenos Ayres	Not stated
Hanseat I	July 4	Disabled	Stavanger	Machinery
Homewood	July 9	Aground	Nr. Pim Mill	Floated
Hester	July 28	Explosion	South Boston	Sank—raised
Hall Cain	July 24	Disabled	Melbourne	Lost rudder
H. W. Baxter	July 23	Aground	Fraser River	Floated
Hera	July 25	Collision	Trondhjem	Not stated
Huronic	Aug. 6	Stranded	Lucile Island	Not stated
Huron	Aug. 9	Stranded	Monte Christi	Floated
Invergrange	July 6	Disabled	Sunderland	Engine
Ionia	July 12	Collided pier	Duala	Damaged
Isabelle Parker	Aug. 10	Collision	Off Gallops Island	Ashore
Jalobert	July 19	Aground	Nr. Bouliots Pt.	Not stated
John W. Chittenden	July 31	Explosion	Clifton S. I.	Cabin
Jerome	July 31	Fire	Hoboken	Not stated
Japanese Prince	Aug. 10	Collision	Broad Sound	Not stated
Julia McGeeney	July 29	Fire	New York	Slight
Jalobert	July 16	Aground	Father Point	Not stated
Janus	July 27	Fire	Calcutta	No. 4 hold
Kiowa	July 23	Aground	Parisenne Island	Port side—bottom floated
Katsura Maru	July 2	Struck rock	Off Korea	Stem; forepeak
Kalfarli	July 26	Ashore	Astoria	Floated
Kolpino	July 18	Collision	Danzig	Frames; dk.
King Egbert	July 16	Collided breakwater	Bunbury	No. 1 hold; tank; forepeak
Kutli	July 16	Struck obj.	Nr. Skammia	Not stated
Kong Magnus	July 25	Collision	Trondhjem	Stern frame
Kinderdyk	Aug. 10	Fire	Buenos Aires	Not stated
Keret	Aug. 8	Ashore	London	Not stated
Livingston Roe	July 24	Collision	Houston Channel	Holed
Lingfield	July 11	Fire	Monte Video	Considerable
La Frileuse	July 11	Collision	46N; 55:38W	Total loss
Maryland	July 19	Explosion	Cape Charles	Not stated
Michael L. Embiricos	July 19	Aground	Nr. Bouliots Pt.	Floated—bottom
M. M. Gardner	July 19	Ashore	Nr. Baldwin	Floated—leaking badly
Marie Horn	July 25	Disabled	San Juan	Machinery
Meropi	July 2	Aground	San Pedro Channel	Stern; bridge; steering gear
Mexico	July 1	Aground	Upper Bosphorus	Floated
Moland	July 2	Fire	Nr. Aalborg	Considerable
Manchester	July 3	Disabled	Off Grey Point	Boiler
Megantic	July 6	Fire	Southampton	No. 2 hold
Madras City	July 10	Aground	Nr. Garston Dock	Floated
Magda	July 13	Ashore	San Ignacio Rocks	Not stated
Montrose	July 27	Collision	Nr. Montreal	Damaged
Maasdyk	July 31	Fire	Buenos Aires	No. 2 hold
Munlisto	Aug. 8	Collision	Baltimore	Not stated
Malachite	July 17	Capsized	Sydney	
Maroc	July 30	Collision	Halifax, N. S.	Damaged
Nerissa	July 11	Collision	46N; 55:38W	Not stated
Neville	July 12	Struck rock	Ushant	Stem; plates
Nestlea	July 23	Struck pier	Cape Town	Plates; frames
Nanuk	Aug. 6	Disabled	Teller, Alaska	Propeller
Nantasket	Aug. 10	Collision	Off Gallops Island	Ashore-stem-bow
Newton Beech	July 17	Collision	Traverse	Not stated
Nevada	Aug. 11	Ashore	Saratoga Spit	Not stated
Oljaren	July 5	Collided dock wall	Preston	Stem; forepeak
Oshogbo	July 12	Aground	Lagos	Total loss
Orcadia	July 20	Collision	Stronsay	Not stated
Princeton	July 16	Collision	Key West	Port side
Pass of Ballater	July 13	Collision	Off Avonmouth	Stem
Portfield	July 12	Aground	Buenos Ayres	Not stated
Parks Foster	July 19	Disabled	Buffalo	Rudder; lost shoe
Pasqua	July 18	Aground	Punta Indio	Not stated
Pacific	Aug. 8	Explosion	Tremley Point	Considerable
Queensland Transport	July 12	Aground	Buenos Ayres	Damaged
Republica	July 16	Fire	Valparaiso	Total loss
Raby Castle	July 21	Fire	London	Nos. 3 and 4 holds
Rahman	July 10	Capsized	Nr. Chumporn, Siam	
Rose Castle	July 27	Collision	Nr. Montreal	Damaged
Rose	July 14	Stranded	Croggan Isle of Mull	Floated
Ravens Point	July 14	Fire	Castellamare	Nos. 3 and 4 hold
Rockland	July 27	Collision	New York	Beached
Saranac	July 17	Aground	Southend	Floated
Silverspruce	July 14	Collision	Off Point Bonita	Badly
Seattle	July 14	Collision	Off Point Bonita	Badly
Strandhill	July 20	Ashore	Port-au-Port Bay	Not stated
Siva	July 2	Ashore	Off Breskens	Floated
Seminole	July 9	Struck breakwater	Madras	Stem
Shunyo Maru	July 7	Stranded	Nr. Fukuyama	Not stated
Sirlo	July 13	Aground	River Severn	Floated
St. Michel	July 10	Collision	River Scheldt	Not stated
Salandia	July 20	Fire	Gravesend	Nos. 1 and 2 holds
Stella Lykes	July 25	Collision	Houston Channel	Badly
Stanley Dollar	Aug. 7	Explosion	Off Kuriles	Not stated
Sarasota	Aug. 3	Collision	Nr. Tampa	Plates
Scow No. 57	Aug. 10	Collision	Broad Sound	Sank
Sagatind	July 29	Aground	Madket Aland Sea	Floated—forepeak
Saleier	July 31	Collision	Deli	Above water line
Silarus	July 28	Ashore	Rio Grande do Sul	Bottom
Steiermark	July 30	Disabled	Rotterdam	Machinery
Tampa	July 26	Disabled	Melbourne	Machinery
Twickenham	July 2	Ashore	Point Edward	Floated
Tiara	July 5	Aground	Buenos Ayres	Not stated
Torlak Skogland	July 9	Struck quay wall	Havre	Bows
Thornbury	July 12	Collision	Flushing	Stranded
Tory Island	July 20	Collision	Stronsay	Port side
Terre Neuve	July 30	Collision	Halifax, N. S.	Damaged
Valdare	July 22	Struck Reef	Cape Elizabeth	Lost rudder and post
Ville De Damas	July 2	Fire	Marseilles	Nos. 1 and 2 holds
Ville De Marseille	July 4	Fire	Port Said	Damaged
Wilton	July 9	Disabled	Stockholm	Machinery
W. H. Sawyer	Aug. 11	Hvy. weather	Lake Huron	Sank
Yalou	July 29	Collision	Wielingen Channel	Damaged
Zuiho Maru	July 5	Ashore	Kasadoshima	Floated—bottom
Zeus	July 26	Collision	Tunis	Plates

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Car Handling Cranes for Sea Train Ferry

The project of the Overseas Railway Inc. for ferrying railroad cars between New Orleans and Havana is progressing steadily. The first car-ferry, named SEATRAIN, was recently launched at the yard of Swan, Hunter and Wigham Richardson, England and should be ready for service before the end of the year.

In the meantime, one of the important features of this service, two unusual and elaborate car loading cranes are being built by the Shaw Crane Putnam Machine Co., Muskegon, Mich. These cranes are designed for loading and unloading entire freight cars in and out of the train ferry mentioned above. These cranes will be installed on the piers of the Overseas Railways Inc. at Havana and New Orleans. The cranes are completely electrified with General Electric equipment and are rated at 105 tons capacity. Power will be furnished by two 250 horsepower, direct current, mill type, completely enclosed motors. The control will be of the magnetic type.

Depth Finder on Liner

The executive offices of the United States lines in New York announced on Sept. 28 that the LEVIATHAN has been fitted with a Fathometer for determining the depth of water automatically at all times, making it possible for the navigating officers to plot their course from the contour of the bottom of the sea as accurately in darkness and fog as in clear daylight. The LEVIATHAN, being by far the largest and finest ship of the American merchant marine was fitted with this latest scientific aid to navigation in order to insure by all possible means her safety and that of her large crew and her passengers. This latest safety device is comparatively new but it has already proved its efficiency and its worth.

Board Sells Oil Tankers To Private Owners

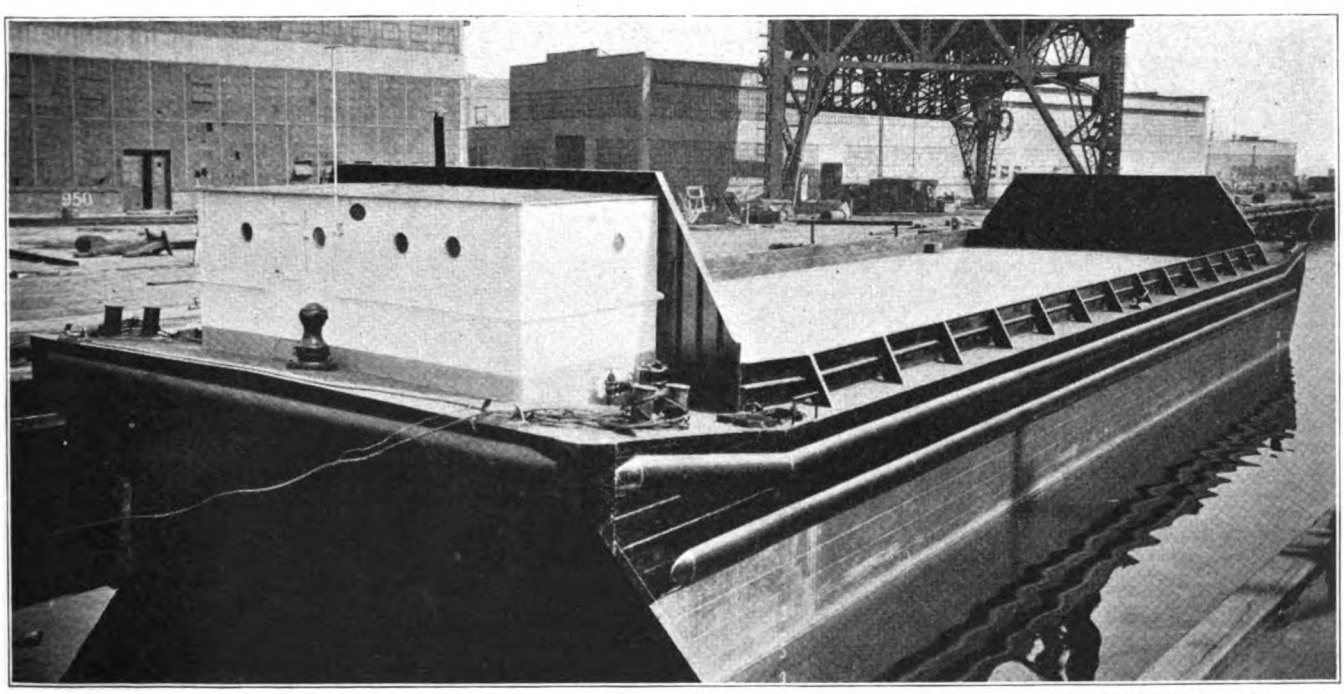
On Sept. 21 the United States shipping board approved the sale of four oil tankers for a total sum of $1,156,860. The tankers, DARDEN and GLADYSBE were bought by the Clinchfield Navigation Co., New York for $227,600 each. The Gladstone Transportation Co., Baltimore bought the STOCKTON for $249,650 and the SALINE for $352,000.

The DARDEN and GLADYSBE are of 7500 deadweight tons each and were at the time of the sale at Mobile and New York, respectively. The SALINA and STOCKTON, each of 9816 deadweight tons were both at the time of the sale at San Francisco. The board was to readvertise for sale the tanker, BRANDYWINE. The board now has five tankers left to meet the needs of its fleet. Slowly but surely the board is turning its fleet of merchant vessels over to private operators to the benefit of shipping.

Shipyard Builds An All Welded Scow

THE Federal Shipbuilding & Dry Dock Co., on Oct. 11 invited inspection of its first all-welded steel scow, afloat at the shipyard, Kearny, N. J. This scow shown in the accompanying illustration is 116 feet long by 34 feet wide by 10 feet 3 inches deep and will carry about 850 short tons of cargo. There is not a rivet used in its construction and all joints on the sides, bottom and deck are doubly sealed by electric welding throughout the entire structure.

It is believed that the change from wood to steel construction is inevitable on the grounds of maintenance cost. It is also recognized that rivets are the source of trouble to operators not only when damage occurs but from corrosion. The successful application of welding in machinery and in the making of pipe lines suggested to the Federal Shipbuilding & Dry Dock Co. the idea of combining these two desirable steps in advance at one move, that is to go from wood to welded steel construction. So much interest was shown in this all-welded scow that the shipyard finally made the necessary arrangements for those who wished to inspect it after completion. This job represents a significant step in modern shipbuilding.



ALL WELDED STEEL SCOW BUILT BY FEDERAL SHIPBUILDING & DRYDOCK CO., KEARNY, N. J., CAPACITY 850 TONS

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Up and Down the Great Lakes

Lake Steel Shipments—Insurance Rates—Record Ore Cargo—Island Airport—Lake-Levels—Lakes To Europe—Diesel Electric Ferry

GREAT Lakes transportation companies are gradually swinging into their winter schedules. For 60 days several have been operating on a modified winter schedule, with more than their usual fall boats in operation. The Goodrich Transit Co., Chicago, has been operating one boat each on the daily Benton Harbor and Holland, Mich., services, but will combine these two services under one daily boat trip soon. The West Ports line is maintaining a freight line to Manitowoc, Wis., from Chicago, and will continue this regular service until weather conditions interfere.

Lake Steel Shipments

Shipments of finished steel products continued on the Great Lakes until Nov. 1. The regular schedule from a Buffalo lake steelworks to Chicago and Milwaukee was maintained throughout October, and shipments from the Chicago district to Canadian points continued on the regular schedules throughout last month. Pig iron shipments ended in September. The last cargo of the season from a Cleveland blast furnace interest to Milwaukee, was lightered at Detroit, but the cargo finally was delivered at Milwaukee late in the month.

Late Insurance Rates

It is interesting to note that the increase in insurance on vessels in operation after Nov. 30 increases three quarters of one per cent for the first five days in December; one and one-eighth per cent from December 5 to 9 and one and one-half per cent from December 9 to 12. Up to this writing though a large number of vessels have engaged to take grain cargoes for the last half of November no vessel had been reported chartered for loading in December.

Record Ore Cargo

According to the *Toronto Globe*, the two greatest ore cargoes ever carried on the Great Lakes were brought from Marquette to Sault Ste. Marie, Ont., for the Algoma Steel Co. during September by the S. S. DONNACONA of the Canadian Steamship lines. On Sept. 2 the DONNACONA carried 14,677 tons of ore between the two points. On Sept. 11 she carried 14,648 tons.

September Lake Levels

The United States Lake Survey reports the monthly mean stages of the Great Lakes for the month of September as follows:

Lakes	Feet above mean sea level
Superior	603.40
Michigan-Huron	580.44
St. Clair	575.16
Erie	572.12
Ontario	246.17

Lake Superior was 0.38 foot higher than in August and it was 0.74 foot higher than the September stage of a year ago. Lakes Michigan-Huron were 0.06 foot lower than in August and they were 1.26 feet higher than the September stage of a year ago, 0.57 foot above the average stage of September of the last ten years. Lake Erie was 0.47 foot lower than in August and it was 0.48 foot higher than the September stage of a year ago. Lake Ontario was 0.47 foot lower than in August and it was 0.90 foot higher than the September stage of a year ago, 0.63 foot above the average stage of September of the last ten years.

Island Airport

Chicago has voted a bond issue for the building of an island airport on an island in Lake Michigan, just off Grant Park. The plans call for the building of hangars, repair shops and auxiliary buildings. Work will be started on construction of the island next spring. Grand Haven, Mich., has completed its airport, which will be an important landing for planes crossing Lake Michigan.

From Lakes to Europe

In spite of the restricted depth of water in the present St. Lawrence waterway from the lakes to the sea, a number of small Norwegian steamers, having brought cargoes of one kind or another into the Great Lakes are taking on grain cargoes for the homeward voyage. The BOREAS, or substitute, for instance engaged for middle of November loading at Fort William and, or, for Port Arthur on the basis of 40 cents for one port of Sweden. She will complete cargo at Montreal on the basis of 22 cents and including the delay there will in all consume about four weeks from the time she is loaded until time of discharge. The significant feature about this is, of course, the fact that even under present very difficult conditions, ocean vessels do trade from the Great Lakes to European ports.

Lake Grain Movement

During September Fort William and Port Arthur, Ont. shipped 32,079,903 bushels of grain by water. This grain was carried in 136 vessels. Of this number 53 American steamers carried 17,278,571 bushels to American ports. Four Canadian vessels also took cargo to American ports while the remainder of the grain was carried to Canadian ports by 79 Canadian vessels. Shipments for October, when the figures are in, will show a considerable increase over September. The best rate paid loading in October to hold grain at Buffalo was 8½ cents.

The ore trade continued active during the first sixteen days of October shipments of ore totaled 4,500,000 tons and the total movement for the entire month, it is estimated will exceed 8,000,000 tons which is a considerable increase over the same month last year.

Canadian Ship Work

Contract has been awarded by the department of marine and fisheries of Canada to the Halifax Shipyards, Halifax, N. S., for a large icebreaker. The propelling machinery and boilers for this vessel are to be built by the Collingwood Shipyards Ltd., Collingwood, Ont.

Sometime ago Canadian Vickers received an order from the Canadian government for a small vessel for customs and excise preventative service for use on the Atlantic coast.

Diesel Electric Ferry

The contract for the complete electrical equipment of a new double ended ferry for the San Diego-Coronado Ferry Co. has been awarded the Westinghouse Electric & Mfg. Co.

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The vessel will be built by the Moore Dry Dock Co., San Francisco.

The propulsion equipment will comprise two main diesel engine generator units and two propulsion motors of 750 horsepower each. Each generating unit consists of an Atlas Imperial 8-cylinder diesel engine of 500 brake horsepower operating at 277 revolutions per minute and directly connected to a 325-kilowatt, 250-volt shunt wound generator and a 25-kilowatt, 125-volt compound wound exciter.

The propulsion motors are single armature, shunt wound 500-volt machines operating from 150 to 180 revolutions per minute. Provision has been made in the propulsion circuit so that when the ferry boat is under way the after propulsion motor carries practically all of the load, the forward motor making revolutions sufficient only to eliminate the resistance of the forward propeller.

New Jersey Ship Canal

Abandonment of the old Morris canal in New Jersey, which is to be completed within a year, will release nearly a million dollars for the purchase of a right of way for the long agitated New Jersey ship canal between Bordontown on the Delaware river and Morgan on Raritan bay. This ship canal will afford a great reduction in the water distance between New York and Philadelphia.

Among others who have recommended the construction of this ship canal is Walter Wood of R. D. Wood & Co., of Philadelphia.

C. G. Whiton, who since 1915 has been superintendent of the Hudson River Day line, died at his home, Jackson Heights, N. Y., on Sept. 29.

Ocean Freight Rates

Per 100 Pounds Unless Otherwise Stated

Quotations Corrected to Oct. 18, 1928 on Future Loadings

NOTE: FREIGHT RATES STEADY WITH SLIGHT CHANGE

New York to	Grain	Provisions	Cotton (H. D.)	Flour	General cargo cu. ft.	General cargo 180 lbs.	††Finished steel	REMARKS Freight Offered
Liverpool	2s 6d	$0 60	$0.45	0.20	$0.50	$0.90	$8 00T***	Fair
London	2s 6d	0.60	0.45	0.20	0.50	0.90	8.00T***	Fair
Oslo	$0.14	0.45	0.50	0.30	0.42½	0.85	8 00T	Fair
Copenhagen	0.12	0 45	0.50	0.30	0 50	1.00	8.00T	Fair
Hamburg	0.13	0.35	0.45	0.24	0.50	0.90	10 00T	Good
Bremen	0.12	0.35	0.45	0.24	0.50	0.90	10 00T	Fair
Rotterdam and Amsterdam	0.10	0.32½	0.40	0 20	0.40	0.75	9.50T	Good
Antwerp	0.14	0.32½	0.30	0.23	0.45	0.80	7.50T	Fair
Havre	0.11	0.55	0 31	0.30	0.45	0 80	9.00T	Good
Bordeaux	0.11	0.55	0.31	0.30	0.45	0.80	9.00T	Good
Barcelona	....	0.50	0.30	10.00 bags	—12.00T—		10.00T	Fair
Lisbon	....	0.65	0.45	8.00T bags	—23.00T—		8.00T	Fair
Marseilles	....	0.65	0.40	7.00 bags	—23.00T—		8.00T	Poor
Genoa	0.15	14.25T	0.50	9.00	—23 00T—		11.50T	Fair
Naples	0.15	14.25T	0.50	9.00	—23.00T—		11 50T	Fair
Constantinople	0 27	20 00T	0.75	0.40½	—24.00T—		11.50T	Very good
Alexandria	....	20.00T	0.75	0 40½	—24 00T—		11.50T	Very good
Algiers	....	0.75	0.60	8.0T bags	—23.00T—		11.50T	Fair
Dakar	....	17.00	....	15 50T	—23 00T—		11.50T	Fair
Capetown	....	18.00	....	13.00 per 2240 lbs.	20 00		20 00	Very good
Buenos Aires	....	22.00T	....	....	20.00 to 22.00T†		8.00 to 8.80T	Good
**Rio de Janeiro	....	22.00T	....	....	20.00 to 22.00T†		7.00 to 7.70T†	Good
Pernambuco	....	22.00T	....	9.00T	—22.00T—†		9.70T†	Good
Havana	0.30*	0.50	....	0.30*	0.61	1.33	10 00	Fair
Vera Cruz	0.25 to 0.35	0.40	0.50	0.35	x		0.25 to 0.35	Fair
Valparaiso	....	1.07	....	0.70	....	....	10 00T	Fair
San Francisco	....	0.45 to 0.90	....	0.40 to 1.10	....	....	0.25 to 0-30	Very good
Sydney	....	18.00T	1.25	18.00T	18.00-24.00T		8.00 to 11.00T	Fair
Calcutta	....	....	0.60	10.00T	—16.00T—		10 00T	Fair

T—Ton. ‡Per quarter of 480 lbs. †Landed. ††Heavy products limited in length. *Extra charge for wharfage. **Plus $0.50 surcharge on all rates to Rio de Janeiro on account of congestion. ***Plus 15 per cent. xNo general cargo rates to Vera Cruz.

From North Pacific Ports to	Lumber Per m. t.
San Francisco	$4.00 to 4.50
South California	4.50 to 5.00
Hawaiian Islands	9.00 to 10.00
New Zealand	15.00 to 18.00
Sydney	11.00 to 13.50
Melbourne-Adelaide	12.00 to 14.00
Peru-Chile	11.75 to 14.00
South Africa	17.00 to 20.00
Cuba	14.00 to 15.00
United Kingdom	60s to 65s
Baltimore-Boston range	$13.00 to 14.00
Florida Range	No rate
Buenos Aires	14.00
South America — East Coast	14.00 to 17.00
South America — West Coast	11.75 to 14.00
China	9.00 to 9.50
Japan	7.00 to 8.00
Japan (logs)	12.00 to 14.00
Atlantic—Gulf	12.00 to 13.00

Flour and Wheat	
U. K. and Continent (gross tons)	27s to 30s
Oriental Ports (net tons)	$3.50 to 4.50

NOTE: Lighterage rates on fuel in New York reduced from 6½ to 5½c per barrel. The coal strike in Britain is now settled and freight rates or bunker prices for coal or pig iron are again quoted.

General cargo rates to Havana change daily and are omitted for the time being.

Rates to Calcutta are subject to change without notice. Cotton goes only to Bombay. Landing charge of $2.00 per freight ton at Valparaiso.

Principal Rates To and From United Kingdom

	s	d		s	d
Grain, River Plate to United Kingdom	21	6	Pig iron, United Kingdom to New York or Philadelphia	12	6
Coal, South Wales to Near East	10	3	Iron ore, Bilbao to Cardiff	6	0
Coal, United Kingdom to Buenos Aires	15	0	Iron ore, Huelva to Phila. or Balto	11	0
Manganese Ore, Poti to Philadelphia	$3.80				

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Dec. 20, 1927	5.35@5.65	1.41½	5.15
Jan. 15	5.25@5.60	1.41½	5.15
Feb. 20	5.25@5.60	1.40	4.92
Mar. 20	5 00@5 60	1.40	4.92
April 19	5.00@5 60	1.40	4 92
May 19	5.00@5.60	1.30	4.92
June 19	5 00@5.60	....	4.92
July 18	5 00@5.60	1.10	4.92
Aug. 18	5.00@5.60	1.10	4.92
Sept. 18	5.65	1.10	4.92
Oct. 18, 1928	5.65	1.10	4.92

At Philadelphia

	Coal trim. in bunk per ton	Fuel oil alongside per barrel	Diesel Eng. oil alongside per gallon
Dec. 20, 1927	5.20@5.65	1.32@1 35	4.88@5.12
Jan. 19	5.25@5.60	1.22@1.25	4.90@5.12
Feb. 20	5.25@5.60	1.21@1.25	4.90@5.12
Mar. 20	5 00@5 60	1.21@1.25	4.64@4.87
April 19	5.00@5.60	1.21@1.25	4.64@4.87
May 18	5 00@5.60	1.20@1.25	4.87
June 19	5 00@5.60	....	....
July 18	5 00@5.60	1 10	4.88
Aug. 18	5.00@5.60	1.10	4.88
Sept. 18	5.65	1.00	4.88
Oct. 18, 1928	5.65	.95@1.00	4.88

Other Ports

Boston, coal, per ton	$7.11
Boston, oil, f. a. s., per barrel	1.22
Hampton Roads, coal, per ton, f.o.b., piers	$4.25 to 4.50
Oct. 7 — Cardiff, coal, per ton	12s 9d
London, coal, per ton	—s —d
Antwerp, coal, per ton	18s 6d
Antwerp, Fuel oil, per ton	80s0d
Antwerp, Diesel oil, per ton	87s 6d
British ports, Fuel oil	67s 6d
British ports, Diesel oil	82s 6d

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Personal Sketches of Marine Men

Frederick H. Fay, of Fay, Spofford & Thorndyke, Port Engineers

By Herbert R. Simonds

ECONOMICAL operation of shipping overseas, coastwise and on inland waterways has been materially advanced by his theoretical and practical grasp of port and terminal problems throughout years of active work.

UNDER his plans and direction the $25,000,000 Boston army base project has been developed into one of the largest and most efficient water front terminals at any port in the country.

AS AN engineer he has consistently worked for the ideal of ample facilities to expedite the despatch of vessels in loading and discharging cargoes in order to reduce the cost of water transportation.

MANY who turn to the business of shipping find their chief interest associated with the moving vessel. To them a vessel in port is a dead thing. It must be moving to be alive and from a business angle it is only when a vessel moves that it makes money. But a vessel must be in port for intervals at the end of each trip, and the investment in port facilities of the average shipping company represents a considerable part of the total investment.

Frederic H. Fay is one of the men whose chief interest turns toward port problems. He was graduated from the Massachusetts Institute of Technology in civil engineering in 1893 and spent the following year in post graduate work. Thereafter for about 15 years he was in the municipal engineering service of the city of Boston, and during this period had an excellent opportunity to study the various port problems, particularly the handling of freight to and from the docks. During the last few years of this period with the city he was in charge of the bridge and ferry division.

In 1914 Mr. Fay organized the consulting engineering firm of Fay, Spofford & Thorndyke, his two partners being Prof. Charles M. Spofford and Sturgis H. Thorndyke. While the work of the new firm covered an extensive field, it specialized in port development. Its work has included many broad problems, such as the co-ordination of marine transportation facilities with municipal and other public needs. A notable example of its work is the Boston army supply base pier a $25,000,000 project upon which the firm served as consulting engineers to the United States war department. This is one of the largest water front terminals in the United States. It was planned, designed and supervised by Mr. Fay's organization and was built in a period of 18 months at a cost less than the firm's original estimate.

At the request of the United States war department Mr. Fay and his associates recently completed a comprehensive study of the origin, movement and destination of all commodities carried by water upon the Great Lakes and their tributaries, with a forecast of the probable changes in the movement of this freight upon the completion of the new Welland ship canal admitting full sized freighters drawing 24 feet into Lake Ontario. The work involved a thorough study of the New York barge canal, of the commodities which should or could move advantageously through the port of Oswego, N. Y. and of the various industries which could economically be located at that port.

After careful study of the port problems at Portland, Me., the firm designed and supervised the construction of the state pier at that city. This provides modern accommodations for passenger and freight business of both foreign and domestic origin. A largely increased volume of business has resulted from this project and marked savings in handling costs and in freight rates have been made. The firm has handled many other projects involving the design and construction of wharves, bulkheads and other waterfront structures throughout the country and as far afield as New Zealand. At the present time Mr. Fay is interested in the development of a large tract of land bordering on the Connecticut river near Hartford, Conn. The problem involves not only the reclaiming of land but the movement of freight.

(*Continued on Page* 78)

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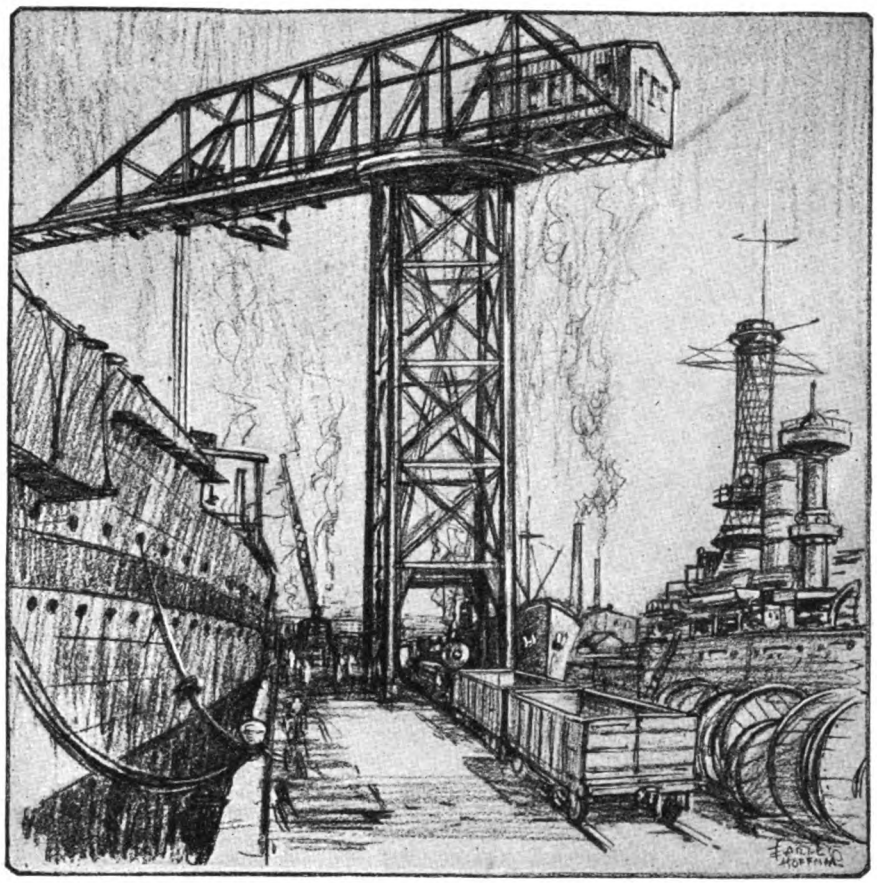

A Shipyard That is Different—

THE Newport News Shipbuilding and Dry Dock Company is different inasmuch as it offers a complete service.

Designing, construction, converting, repairing and refitting are made possible by a combination of resources, facilities, and capacity unsurpassed in America.

Ship owners and prospective builders have found this centralized responsibility, by an organization qualified by matured experience to be highly profitable regardless of the class of work, for this service is as flexible as it is comprehensive.

In the preparation of plans and in the execution of the work there is always afforded close and intelligent co-operation with the client to the end that maximum ship safety and operating economy is assured.

Newport News Shipbuilding and Dry Dock Co.

Newport News, Virginia *233 Broadway, New York City*

FACILITIES UNSURPASSED IN AMERICA

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All national problems involving shipping of goods by water have aroused Mr. Fay's interest. He prepared a lengthy report advocating the St. Lawrence river development so that ocean going vessels could reach the Great Lakes. He has frequently represented the commonwealth of Massachusetts at national waterways conventions.

He is president of the Alumni association of the Massachusetts Institute of Technology, past-president of the American Institute of Consulting Engineers, past-president of the Boston society of Civil Engineers and past-director of the American Society of Civil Engineers. He is a director of the Society of Terminal Engineers, a fellow of the American Academy of Arts and Sciences, and a member of many other professional societies.

Co-operate for Safety in Marine Work

By H. R. Simonds

NEARLY 7000 delegates and guests of the National Safety council gathered from all parts of the country for the seventeenth annual safety congress at New York Oct. 1-5. Headquarters for the marine section were at the Waldorf-Astoria. The meetings were well attended and many valuable papers were read. A. R. Bush, safety engineer, Barber Asphalt Co., and chairman of the marine section who opened the meeting at luncheon on the first day told of the slow start which safety work has had in the shipping industry, but said that recent activities had made up for this delay, and that leading steamship companies were now taking hold of the movement with creditable vigor. He said that one difficulty in building up efficient safety programs in marine enterprises had been lack of co-operation from the top.

Safety work in shipping may be divided into two general classifications, equipment and personnel. Speaking of the equipment phase of the development of safety plans H. J. W. Fay, vice president, Submarine Signal Corp, Boston, described the development and present use of the Fathometer, an automatic depth finding instrument, based on the echo and speed of sound principles. Up until very recent years, the method of depth finding consisted of heaving a line and weight overboard. This is a system not only tedious and inaccurate, but one which can be used only in shallow water. Mr. Fay said that during the year ending June, 1928, there were 1962 disasters to vessels at sea throughout the world. Of these 621 were total or partial losses due to grounding. In most cases, according to the speaker, the cause was lack of knowledge of exact position. Many times the safety of the vessel and the lives of those on board depend to a great extent on the accurate and rapid determination of the depth of water underneath the ship.

John P. Magill, special representative of the New York Maritime association of the Port of New York, told of the work of his association in general safety measures. The maritime association, he said, consists largely of ship owners, agents and operators and representatives of such concerns as drydocks, construction and repair yards, tugboat owners and operators, barge and lighter owners and operators and ship chandlers and stevedores. The work of accident prevention, therefore, has a wide application. The wireless telegraph, the radio compass, the Fathometer and improved means of navigation in many lines have served to greatly reduce the perils which beset the navigator and endanger the lives and property in his charge at sea, according to Mr. Magill. However, problems affecting ship operation while in port, particularly with respect to the loading and discharging of cargoes, do not appear to have been solved to the extent which has been found possible with vessels in transit. The speaker referred to accidents to longshoremen. "Labor conditions as applied to stevedore work have changed greatly during the past 20 years. The men formerly engaged in this work were more familiar with ships and shipping than those of the present day. Many of them had previously followed the sea and by reason of this were better qualified to satisfactorily perform duties developing upon longshoremen. These experienced men knew enough to examine their equipment to see that slings and rigging were safe, and not leave the inspection entirely up to the foreman.

"Today the contracting stevedore has greater responsibility than formerly and is, therefore, more in need of accident prevention work. Competition today is much stronger than it was years ago," continued Mr. Magill, "and this leads to many difficulties having to do with too low bids and the necessity for putting on men who will work for the lowest price. If a ship's agent refuses to consider a low bid the stevedore frequently goes to his superior and after comparison the representative is apt to be censured and perhaps subject to the inference that there is collusion between him and the old stevedore." The low price stevedore, in the opinion of Mr. Magill, is one of the chief contributing factors in the question of accidents around ships.

Practical Safety Suggestions

More work in the field of preventive medicine should be undertaken in the marine industry, according to Dr. Francis X. Crawford, medical officer, United Fruit Co., New York. This is nothing more than a plain safety measure, and the physician, he thought, should have a prominent place in all safety projects.

Herbert Heberman, president of the Export Steamship Corp., New York, presented a paper on, "Making the Safety Movement Attractive to the Personnel," in which he described several methods of introducing a safety program into the business of shipping.

Some excellent practical suggestions were given by Capt. Reginald Fay, marine superintendent of the New York Central railroad, New York. Some of his suggestions are as follows:

Portable gangways with suitable rails to pass to and from the boat lying at the piers while undergoing repairs. Ring bolts fitted to the string-pieces to hold these gangways in place to prevent slipping. Special

Elect Officers

The marine section of the National Safety council at the seventeenth annual safety congress held in New York, Oct. 1-5 elected the following officers for the coming year: Chairman, A. R. Bush, Barber Asphalt Co., Philadelphia. Vice chairmen, A. M. Tode, Texas Co., New York, Robert C. Hand, Standard Shipping Co., New York, and Capt. R. C. Brennan, Oceanic Terminals, Portland, Oreg.

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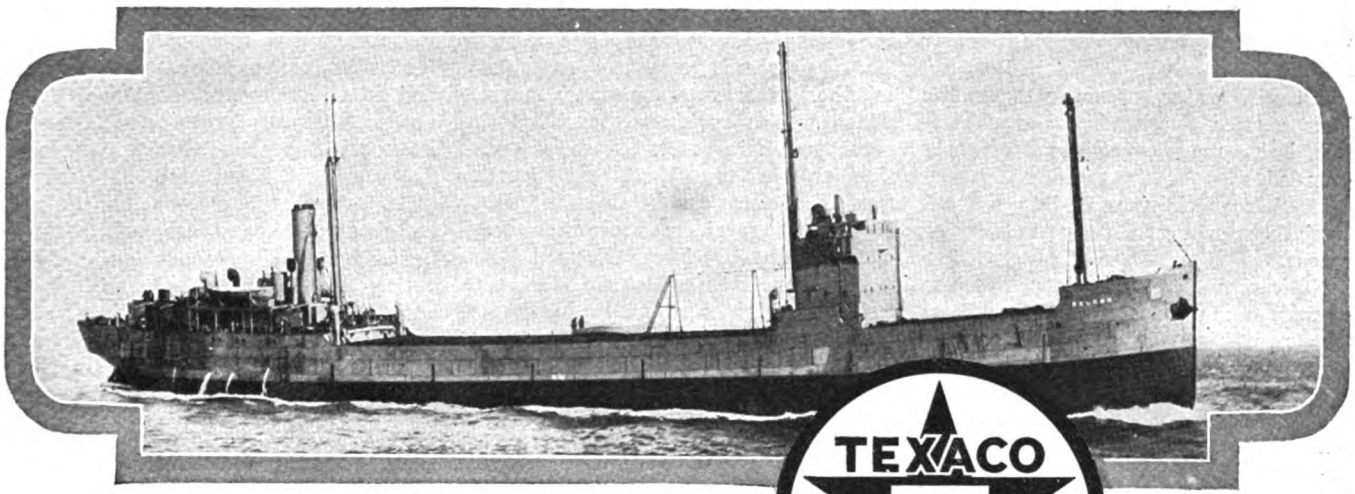

M. V. "BELNOR"
Owner: A/S Belnor (Christian Smith) Oslo, Norway

Equipped with Armstrong Sulzer Diesel Engine,
1350 S. H. P., Gross Tonnage 2750

TEXACO
REG. T. M.

And the Same for the M. V. Belnor:—

No matter what the make of Diesel Engine, there is a Texaco Lubricant that can be depended upon to give EFFICIENT SERVICE.

TEXACO
Diesel Engine lubricants are used exclusively—

—

on Main Cylinders
Compressor Cylinders
and in the Crankcase

There is a Texaco Lubricant for every purpose aboard Ship

STOCKS KEPT AT PORTS THROUGHOUT THE WORLD

THE TEXAS COMPANY

Texaco Petroleum Products
MARINE SALES DIVISION
Dept. KN, 17 Battery Place, New York City
OFFICES IN PRINCIPAL CITIES

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gangways for boarding ferry boats with electric trucks carrying repair material.

All air, water, steam and electric lines carried overhead. Large electric light plug connections properly guarded.

Lumber specially racked to prevent tumbling down and to permit easier access.

Notices on all machines to use guards, and statement of penalties for non use. All air tools returned to tool room and examined each day before being issued again.

As a result of the above suggestions the number of injuries was reduced from 52 for 1926, to 38 for 1927, even though the number of man hours of work increased.

Arthur J. Grymes, president, national board of steam navigation, presented a paper on the importance of the human element. This paper was reprinted in full in the October issue of MARINE REVIEW. Another paper which was also reprinted in full in the October issue of MARINE REVIEW and which was presented at the Thursday session of the congress was the "Relation of Classification to Safety of Ships," by Capt. Charles A. McAllister, president, American bureau of shipping, New York.

W. B. Walker, president, American Steamship Owners' association, New York, presented a paper on safety in the American merchant marine, which was a review of much of the recent work in safety education, particularly in the West. At Seattle, San Francisco and Galveston, Tex., co-operative accident prevention associations have been formed. The paper gave some idea of the surprisingly high cost of accidents.

No matter how perfect the mechanical equipment, the personal equation must always be considered in accident prevention work. This was the subject of a paper by Dickinson N. Hoover, supervising inspector general, steamboat inspection service, department of commerce, Washington.

The Columbian Rope Co., Auburn, N. Y., recently opened a sales office in charge of A. E. Chase at 1083 Drexel building, Philadelphia.

Order Ship Abroad

A contract was recently awarded the Furness Shipbuilding Co., England for building a steamer for the United States Gypsum Co. to carry gypsum rock from Nova Scotia to the company's plant at Philadelphia. This vessel, to be named the GYPSUM PRINCESS, will have accommodations for a limited number of passengers and is a sister ship of the GYPSUM KING, GYPSUM QUEEN and GYPSUM PRINCE. She will be 347 feet long, 52.8 feet in beam and 23 feet in molded depth. The gross tonnage will be about 3915 and she will be propelled by a triple expansion, reciprocating engine. Machinery will be located aft. The three above mentioned ships already in service were all built at the Furness yard and were completed in April last year.

Alfred B. Kreitzburg, advertising manager the Electric Storage Battery Co., Philadelphia, died on Oct. 15 at his home in Springfield, Delaware Co., Pa.

Positions Open

The United States civil service commission has announced competitive examinations to fill the positions of local and assistant inspector of boilers and local and assistant inspector of hulls in the United States steamboat inspection service. Applications for these positions must be on file with the civil service commission at Washington, not later than Nov. 6.

Naval Architects Meet in New York Nov. 15-16

THE thirty-sixth general meeting of the Society of Naval Architects and Marine Engineers will be held in the Engineering Societies building, 29 West Thirty-ninth street, New York city, Thursday and Friday, Nov. 15 and 16, 1928. Thirteen technical papers are scheduled for presentation at the professional sessions which will begin each day at 10 a. m. The council of the society will meet at 3 p. m., Nov. 14, in the board room on the fifteenth floor of the Engineering Societies building, through the courtesy of the American Society of Civil Engineers.

Following established custom the annual banquet will be held at 7:30 p. m. on Friday, Nov. 16, in the grand ballroom of the Waldorf-Astoria hotel. Immediately preceding the banquet a reception will be held beginning at 6:30 p. m. The titles of the papers, their authors, and the order in which they are to be delivered, follows:

THURSDAY, NOV. 15, 1928

1. *"The Scientific Application of Welding to Ship Construction,"* by James W. Owens, visitor.
2. *"Recent Developments in Shipbuilding on the Great Lakes,"* by Albert W. Cross, member.
3. *"Some Observations on the Design of Airplane Carriers and Notes on the* SARATOGA *and* LEXINGTON," by Rear Admiral George H. Rock, C. C. U. S. N., member.
4. *"Design of a Large Flying Boat,"* by Capt. Holden C. Richardson, C. C. U. S. N., member.
5. *"The Inclining Experiment,"* by Rear Admiral John G. Tawresey, C. C. U. S. N., retired, member.
6. *"Propeller Backing Power in Tugboats,"* by Alfred J. C. Robertson, member.

FRIDAY, NOV. 16, 1928

7. *"Development of Pulverized Fuel for Marine Purposes During* 1927-1928," by Carl J. Jefferson, member; Commander Joseph S. Evans, U. S. N., and Commander Joseph Broshek, U. S. N., visitors.
8. *"The Burning of Hydro Carbons Under Marine Boilers,"* by Ernest H. Peabody, member.
9. *"Forced Blast Chain Grate Stoker Tests of a Marine Tube Boiler,"* by Thomas B. Stillman, member.
10. *"Turbine Electric Drive as Applied on the Great Lakes Cargo Ships,"* by C. R. Fisher, visitor, and A. Kennedy Jr., member.
11. *"The Central Power Station Goes to Sea,"* by Commander Quincy B. Newman, U.S. C. G., member.
12. *"Description and Trials of the California,"* by Capt. Roger Williams, member.
13. *"Performance of the Converted Motor Vessels of the United States Shipping Board,"* by Capt. Richard D. Gatewood, C. C. U. S. N., member.

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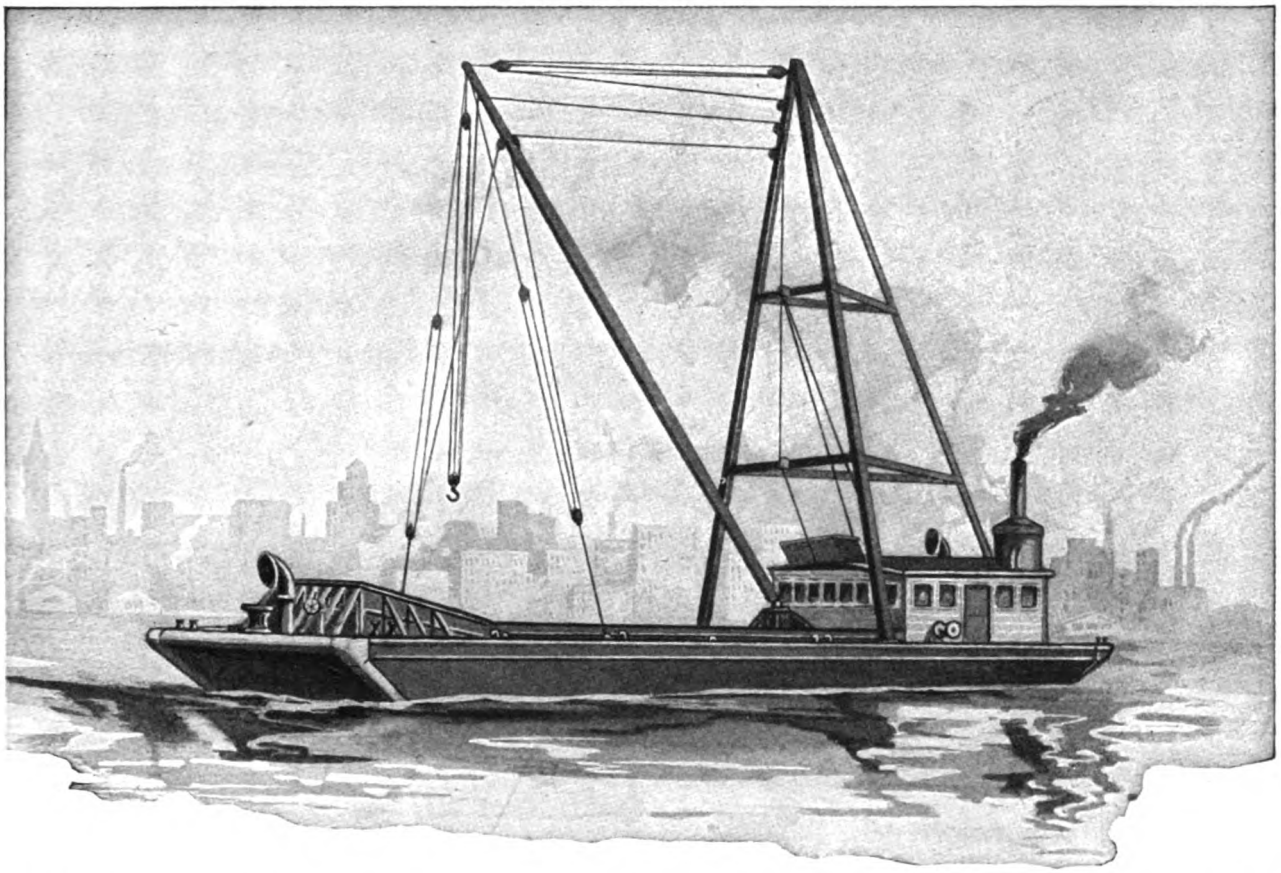

AN ELLIS BARGE
for Export to Porto Rico

The length is 120 feet, breadth 38 feet, and depth 10 feet. The hull is divided into eight tanks. All will carry oil. The two midship tanks may be used for molasses, carrying 128,000 gallons.

An oil and deck cargo barge with derrick, believed to be the first vessel of its kind, is being built for the Porto Rico Coal Company under the Ellis Channel System of Steel Hull Construction. In addition to carrying oil, it will be used as a lighter. The derrick capacity is 25 tons at 40 feet radius. The oil capacity is 61,000 barrels. Detailed information showing how the Ellis System provides the necessary inherent strength for such a remarkably varied service will be sent on request.

ELLIS CHANNEL SYSTEM

PATENTED

INCORPORATED

Central & South American Division
FOX BROS. & CO., INC.
33 Rector St., New York

Atlantic Division
ATLANTIC ELLIS CHANNEL SYSTEM, INC.
33 Rector St., New York

Great Lakes Division
MANITOWOC SHIP BUILDING CORP.
Manitowoc, Wis.

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British Maritime Affairs

(*Continued from Page* 52)

for the first eight months of the year. The August index number showed an increase of 0.95 per cent as compared with a year ago. During September, conditions in the homeward chartering market were disappointing, but at the time of writing there are signs of improvement, especially from the River Plate, and a further improvement is expected. There is fair activity from Montreal, but with no substantial rise in rates. In the Eastern trades, Australia has been quiet, but some attention is being given to grain orders, while Indian trade is fairly active. In the Mediterranean there are some inquiries for coal, timber, and ore, and the Baltic and the White Sea are showing signs of activity.

Characteristic rates at the end of September were as follows: about 21s from the River Plate for grain to the United Kingdom; 13 cents for Montreal grain to Antwerp or Rotterdam; 14s 6d for coal from Wales to the River Plate; 26s from the Nitrate Coast to the continent of Europe; 8s for ore from Bizerta to Boston; on the Pacific coast, Vancouver wheat has been done at 28s 6d for the continent, October-November dates.

The improvements at the Port of London docks are progressing. The second section of a new passenger landing stage at Tilbury was placed in position on Sept. 23. The section is 360 feet long and is claimed to be the largest block of landing stage in the world. The stage, when completed, will be 1148 feet long, slightly less than the Liverpool stage. By the time the third section is placed, early in 1929, the stage will be ready to receive the largest liners afloat. Handling facilities also are being made on the Clyde, and a new electrically-operated cantilever crane of 175 tons lifting capacity is to be erected at Stobcross quay, near Glasgow, to replace the present 130-ton crane.

The foreign trade returns from the board of trade for the first eight months of the year show that entrances of vessels at British ports during the period were less than in the corresponding period of 1927, while the tonnage of clearances was slightly higher. In August this year, 5294 vessels of 5,352,468 tons entered British ports with cargoes to foreign destinations. For the first eight months of the year a total of 39,133 vessels, trading foreign, aggregating 39,689,313 tons, entered British ports. This compares with 41,214 vessels and 40,301,936 tons in the corresponding period of last year. Of this year's tonnage, 21 per cent came from the Atlantic coast of North America, as against 22.5 per cent last year. The total clearances from British ports in the period considered this year were 39,422 vessels of 42,628,830 tons, as compared with 40,190 vessels of 42,281,991 tons in the first eight months of 1927. Of these clearances, 17.90 per cent went to the Atlantic coast of North America this year, as against 16.95 per cent a year ago.

Coal Exports Slightly Less

For the eight months ended Aug. 31, 1928, exports of British coal were 33,014,890 tons, as against 34,752,591 tons in the corresponding period of last year, and 18,973,654 tons in 1926, the year of the coal stoppage. Coal shipped for the use of steamers engaged in foreign trade in the eight months of this year was 11,012,863 tons, as compared with 11,033,724 tons in 1927, and 6,327,908 tons in 1926. At the time of writing there are signs of improvement in the British coal trade.

The total value of exports of British goods, exclusive of bullion and specie, for the first eight months of the year was £563,030,035 ($2,740,000,000), as compared with £542,568,102 ($2,635,000,000) in the corresponding period of 1927, and £529,884,253 ($2,555,000,000) for 1926. As compared with 1927, there was a decrease of about £6,000,000 ($29,000,000) in the value of coal exports, and a decrease of £1,744,263 ($8,500,000) for nonferrous metals and manufactures. There were increases of £6,651,276 ($32,300,000) for vehicles, inincluding locomotives, ships, and aircraft; £4,984,284 ($24,000,000) for machinery; £2,648,231 ($12,800,000) for woolens and manufactures; £2,597,029 ($12,550,000) for manufactures of textiles other than cotton, wool, and silk; £1,919,162 ($9,300,000) for chemicals; £1,644,026 ($8,000,000) for leather and manufactures; £1,153,456 ($5,600,000) for cotton yarns and manufactures.

Build Yacht in Germany

A new seagoing diesel yacht, built at Kiel, Germany for Irving T. Bush of New York arrived in the harbor of New York, Oct. 14. This yacht, named the CORONET made the voyage across the Atlantic in thirteen days under her own power. She was designed by Cox & Stevens and it resembles the graceful clipper types of the old English and American steam-yacht. She is 181 feet 6 inches long, is 27 feet wide and is driven by two 425 horsepower diesel engines at a maximum speed of 13 knots. The cruising radius is 7000 miles.

Big Intercoastal Traffic Taxes Line's Capacity

The eastbound freight movement from San Francisco via the Panama canal, always active at this season, promises to set a record during the month of October. In addition to the large regular seasonal movement of dried and canned fruits, unprecedented heavy offerings of general cargo are causing steamship company officials real concern to find space to accommodate them.

Officials of the American-Hawaiian Steamship Co. announced that although their regular schedule provides for ten eastbound sailings from San Francisco during October, cargo offerings are so much in excess of space allotments that they have chartered the S. S. MANUKAI, of 14,500 deadweight tons, which was loaded to capacity within five days of the announcement of its charter.

With the chartering of the MANUKAI, the American-Hawaiian will handle 24 vessels in and out of its San Francisco terminals during October, transporting more than 90,000 weight tons of cargo. In six years the growth of the Panama canal trade has been so great that this company has increased the frequency of its sailings from two a month to better than two a week, and last year paid in canal tolls more than $878,000.

Deep Laden Freighter

The S. S. EDWARD LUCKENBACH Captain Murphy, 425 feet long x 57 feet beam, a vessel of 12,614 deadweight tons cargo capacity, on Oct. 11, passed through the locks of the New Orleans industrial canal drawing 32 feet 3 inches of water and proceeded to her regular discharging berth at Galvez street, with approximately 10,000 tons of canned goods, beans, dried fruit and similar merchandise in her holds from Seattle, Tacoma, Portland, San Francisco and Los Angeles. It is estimated that her displacement as loaded was between 18,000 and 20,000 tons.

The S. S. EDWARD LUCKENBACH is one of the fastest vessels in the Gulf fleet and has made the passage from Los Angeles to New Orleans in 13½ days. The Luckenbach line operates five ships in this trade.

The industrial canal is an artificial waterway of 30 feet minimum depth which connects the deep harbor of the Mississippi river with the waters of Lake Pontchartrain. Its banks are used for industrial purposes.

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American Brown Boveri Electric Corporation

announces

Effective October 1, 1928, the separation of its electric and shipbuilding activities by organizing a subsidiary completely owned, under the name of

New York Shipbuilding Company

leasing to the new company all of the real estate and plant embraced in the active shipbuilding facilities at Camden, New Jersey.

The New York Shipbuilding Company will take over and complete all existing ship contracts for the American Brown Boveri Electric Corporation.

The management includes

W. M. Flook, Chairman of the Board
C. L. Bardo, President
J. E. Slater, Vice-President and Treasurer
E. I. Cornbrooks, Vice-President and General Manager
M. W. Torbet, Assistant General Manager
E. H. Rigg, Naval Architect
A. G. Connell, Secretary
Norman R. Parker, Comptroller

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Reconditioning Prices

(*Continued from Page 60*)

the amount of material and equipment specified to be supplied by the owner is quite different in the Newport News scheme and the Gibbs scheme and no direct comparison can be made on the basis of the bids received.

Diesel Conversion Bids

It will be recalled that bids were received on Aug. 21 by the shipping board from various shipyards for improvements and installation of diesel engines in eight freighters. A complete summary of these bids was published on page 64 of the September MARINE REVIEW. With the exception of the bids submitted by the Maryland Dry Dock Co. the prices asked were considered too high. As a result of these bids the Maryland Dry Dock Co. was awarded the contracts for dieselizing the freighters GALVESTON and the OLDHAM, diesel engines being furnished by McIntosh & Seymour Corp. New bids were requested for the remaining six vessels.

The new bids for converting the remaining six vessels to diesel engine drive were received late in September and awards under these bids were made about Oct. 9 to the Maryland Dry Dock Co. for the two vessels, POTTER and JEFF DAVIS; to the Federal Shipbuilding & Dry Dock Co. for the two vessels NEW ORLEANS and WICHITA; and to the Newport News Shipbuilding & Dry Dock Co. for the two vessels, CITY OF ELWOOD and WARD. That means that the program for the conversion of eight vessels is now under way.

A complete summary of the final bids received follows:

Maryland Dry Dock Co., JEFF DAVIS and POTTER, $1,095,725; CITY OF ELWOOD and WARD, $1,119,011; NEW ORLEANS and WICHITA, $1,127,-821.

Bethlehem Shipbuilding Corp., any two vessels, $1,267,000.

Federal Shipbuilding & Dry Dock Co., any two vessels, $1,125,000.

Morse Dry Dock & Repair Co., JEFF DAVIS and POTTER, $1,154,940.

Newport News Shipbuilding & Dry Dock Co., CITY OF ELWOOD and WARD, $1,110,000.

Sun Shipbuilding & Dry Dock Co., CITY OF ELWOOD and WARD, $1,260,-000; NEW ORLEANS and WICHITA, $1,-269,000; JEFF DAVIS and POTTER, $1,-270,000.

Todd Shipyards Corp., NEW ORLEANS and WICHITA, $1,319,000.

United States navy yard, Boston, CITY OF ELWOOD and WARD, $1,260,-903; NEW ORLEANS and WICHITA, $1,-270,371; JEFF DAVIS and POTTER, $1,-251,824.

Order Passenger Ships

A CONTRACT was recently awarded the Union plant of the Bethlehem Shipbuilding Corp. to build an exact duplicate of the WAIALEALE for the Inter-Island Steam Navigation Co. This proves clearly that the latter vessel delivered last spring by the Union plant to the same company has won credit in service and that she is evidently a satisfactory ship.

The general characteristics of the new vessel are: Length between perpendiculars, 295 feet; length overall, 310 feet 10 inches; beam, 48 feet; depth molded to shelter deck, 27 feet; deadweight capacity, 1800 tons; displacement, 4070 tons; shaft horsepower, 4000; speed, 16 knots and fuel oil capacity, 530 tons. Steam is supplied by four Babcock & Wilcox watertube, oil burning boilers. Twin screws are driven by two Westinghouse turbines of 2000 shaft horsepower each and of complete expansion, impulse reaction type connected to propeller shafts by double reduction gears. The propeller speed is 135 revolutions per minute.

Some of the auxiliaries are: Two geared turbine driven circulating pumps; three vertical motor-driven condensate pumps; two sets of twin, two-stage condensing, air ejectors; two 75-kilowatt marine type, geared turbine, direct current generator sets, for auxiliary power and light; one auxiliary condenser; and one switchboard. All of the machinery, main and auxiliary enumerated above except the boilers will be furnished by the Westinghouse Electric & Mfg. Co. The same company will also furnish galley ranges, bakeoven, 100 electric fans, forced draft fan motors and fuel oil service pumps.

Accommodations will be provided for 218 first class and 96 steerage passengers in addition to a crew of 67 men. The vessel will have two continuous steel decks, three cargo holds, two steel pole masts, two three-ton booms, two five-ton booms and one 20-ton boom. In addition to the reliability, simplicity and the convenience in duplication and standardization the officials of the Inter-Island Co. were moved to duplicate the WAIALEALE in this new vessel because of her excellent economy. It is reported since going into service last June that the WAIALEALE at sea has had an average consumption of 0.9-pound of fuel oil per shaft horsepower for all purposes.

Shortly after the announcement of the order for a duplicate of the WAIALEALE word was received that the Inter-Island Steam Navigation Co. has contracted for a third, somewhat smaller, ship with the Union plant of the Bethlehem Shipbuilding Corp. at San Francisco. This vessel will be used in the Inter-Island company's growing trade in the Hawaiian Islands for carrying passengers and cargo. The new vessel's overall length will be 220 feet and she will be of 1200 tons gross. She will have a single screw and will be propelled by a 1700 shaft horsepower Westinghouse, complete expansion, impulse reaction, 3600 revolutions per minute turbine driving the propeller through a single case floating frame reduction gear.

The main turbine and underneath condenser will be located in an engine room aft, and will be a duplicate of the corresponding machinery installed on one shaft of the WAIALEALE except that the gear ratio will be increased to give slower revolutions per minute of the propeller and the condenser will be placed longitudinally under the turbine instead of athwartship. Steam will be generated by two Babcock & Wilcox watertube boilers to operate the main turbine at 265 pounds gage throttle pressure, 75 degrees superheat and 28.6 inches of vacuum.

One of the interesting reasons advanced why the owner went to turbine reduction gear machinery for such a comparatively low power is that he has found that vibration has an ill effect on the cattle which it is the custom to carry on deck. From experience with the WAIALEALE, the turbine machinery eliminated all noticeable vibration and therefore adds materially to the comfort not only to the passengers but to the health and safety of the live cargo carried.

Represents Pump Company

The Warren Steam Pump Co. Inc., Warren, Mass., has announced the appointment of Martin L. Katzenstein, 117 Liberty street, New York city as exclusive eastern marine representative for that company. Mr. Katzenstein has a high standing in the marine profession and is widely known by steamship men and shipbuilders.

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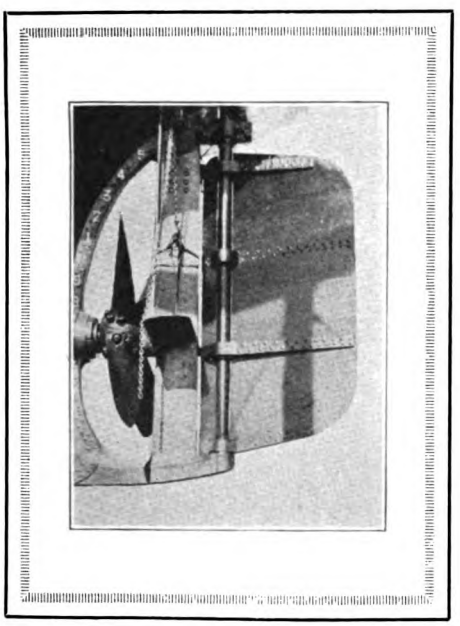
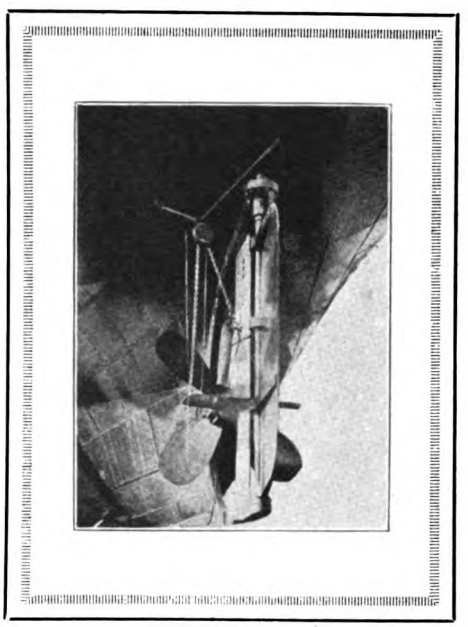
Collingwood Shipyards Limited

SOLE LICENCEES FOR CANADA - - FOR STAR CONTRAPROPELLERS AND RUDDERS

Collingwood, Ontario



PHOTOGRAPHS show the STAR CONTRAPROPELLER fitted to the steamer "SAND MERCHANT". This installation resulted in a saving in power of 12%. Also, the steering qualities were greatly improved.



STAR CONTRAPROPELLERS have been fitted to 425 vessels representing 2,577,181 tons with an aggregate of 1,035,493 I. H. P.

The main advantages are:

Saving in power of from 10% to 15% for the same speed.
Increase in speed of from 5% to 10% for the same power.
Improved steering, which is important in handling ships in canals and narrow waterways.
Reduction in vibrations.
The Contrapropeller is applicable to all types of vessels.

PLANS AND ESTIMATES WILL BE FURNISHED ON APPLICATION

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Diesel Drive Efficiency

(*Continued from Page 67*)

it is automatically taken care of by their positive mechanical connection to the main engine. When the latter runs, the built-in auxiliaries are also forced to run and the problem of operating them is reduced to that of controlling their output, be it water, air or oil under pressure. In brief, they frequently make a cleaner-cut job of the engine room installation and generally give the operating engineer fewer details to supervise.

Advantages of Attached Auxiliaries

The accompanying illustration of the auxiliary units of an 800-horsepower marine diesel engine shows one of the developments along this line. A separate unit is bolted to the side of the scavenging pump crank case and is made up of a two stage air compressor and pumps for cooling water, bilge and lubricating system consisting of the cooling oil pump and the piston cooling oil transfer pump. Where independent auxiliaries are desired this unit assembly is simply unbolted by the engine manufacturer and taken off.

In certain types of vessels and for special services the diesel electric drive has advantages that entirely offset the higher first cost of such installations. The Ward-Leonard system with direct current and variable voltage control has been most widely used for diesel electric drive. An accompanying illustration shows a rather interesting development for this service with the direct-current generator mounted on one end of the engine and exciter for the variable voltage control mounted on the other end, making a very compact installation. There is also considerable development work going on in connection with the adaptation of alternating current motors for variable speed drive.

The direct drive continues to hold its own under certain conditions due to the flexibility which is being attained with direct reversing engines having pilot house control and, due also to the fact that the installation is simpler and less expensive than the diesel-electric type of drive.

The choice between direct drive and electric drive depends entirely upon the service in which the vessel is engaged. In many special types of service the electric drive is unquestionably the most logical application to consider.

I. M. M. Liner Keel Laid

The Newport News Shipbuilding & Dry Dock Co. on Oct. 15 laid the keel for the third 33,000-ton turbo-electric liner for the Panama Pacific line of the International Mercantile Marine Co. It was laid on the same ways from which the second of these ships, the VIRGINIA, was launched on Aug. 18. The new vessel will be a sister ship of the CALIFORNIA which entered the coast to coast service in the Panama Pacific lines last January and also of the VIRGINIA which is scheduled to leave New York on her maiden trip to the west coast on Dec. 8 The liner whose keel has just been laid, it is expected will be ready for service in December, 1929.

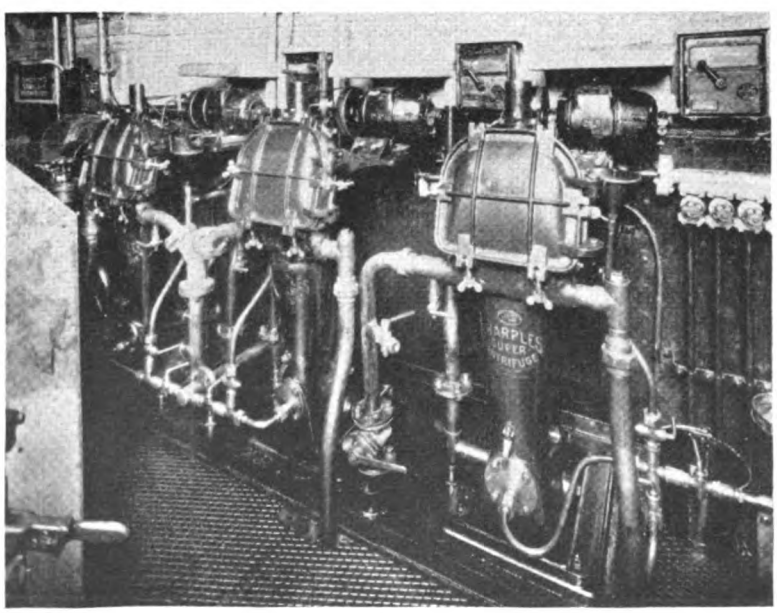
A loan to aid in the construction of the sister ship of the S. S. CALIFORNIA and the S. S. VIRGINIA, now being built for the American Line Steamship Corp. at the Newport News Shipbuilding & Dry Dock Co. was approved by the shipping board Sept. 25. The maximum amount of this loan will be 75 per cent of the cost of the vessel or $5,250,000 which ever shall be the lesser. As the vessel is designed for intercoastal service interest on the loan will be at the rate of 5¼ per cent per annum. Repayment will be made over a period of 20 years, in equal annual instalments and interest payable semiannually.

Made Chief Engineer

N. L. Mortensen has been appointed chief engineer for the Cutler-Hammer Mfg. Co. T. E. Barnum, former chief engineer has been appointed consulting engineer. Mr. Mortensen has been connected with the Cutler-Hammer Mfg. Co. for twenty-one years, the last five of which he has served as assistant to Mr. Barnum.

A shipyard with an individuality all its own, the Hanlon Dry Dock & Shipbuilding Co., Oakland, Calif., has been consolidated with a comparatively new and progressive concern, the General Engineering & Dry Dock Co. of Alameda.

Use Oil Purifiers in Diesel Installations



GOOD operation requires that every care be taken to see that all machinery operates under as nearly ideal conditions as it is possible to have. There can be no excuse for laxness and indifference to those standards which are necessary if any machinery is to stand up in service. No feature along this line is more important than to make certain that both the lubricating oil and engine fuel oil for diesel ships are free from all injurious foreign matter. For this purpose practical operation has proved the great value of the highly developed modern, oil purifier. The accompanying illustration shows three No. 6 Sharples presurtite, super centrifuges, for purifying fuel and lubricating oil on the motorship, SILVERASH *of the Silver Line Ltd.*

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